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Original Articles.

VENEREAL DISEASE PROBLEMS AMONG INDIAN WOMEN.*

By C. A. GOURLAY, D.S.O.,
LIEUT.-COLONEL, I.M.S.

INTRODUCTION.

THE Voluntary Venereal Hospital at Alipore is, I believe, the only hospital of its kind in India. It owes its origin to the activity of those of our predecessors who endeavoured to control the spread of venereal disease by law. In 1869, 54 years ago, a Contagious Diseases' Act was passed. This was commonly known as Act XIV or *Chauda Ain*. Under this Act, medical officers were appointed and inspection centres created. The medical officers, attended by representatives of the police, inspected public women either at their own homes or at these centres, and examined them for venereal infection. Indian public women who were found to be infected were compulsorily removed to the *Chauda Ain* Hospital for treatment. European women were sent to a Lock Hospital at Sealdah and anyone conducting the profession of prostitution while infected was prosecuted.

In those days, this hospital consisted of one pucca building with hutting for about 500 patients and was under the control of the Commissioner of Police.

In 1883, the Contagious Diseases' Act was repealed and these hospitals for women were made over to the Medical Department for the voluntary treatment of venereal disease. The hospital at Sealdah does not appear to have flourished to the same extent as that at Alipore, as I understand it was abolished about 1902, owing to lack of patients. The Voluntary Venereal Hospital at Alipore has been carried on ever since 1883, and of recent years the beds have been in great demand. It is known to this day among Indians as the *Chauda Ain* Hospital. The records show that the work has increased under the voluntary system.

As probably few of you know the hospital, I will give you a brief description of it at the present day. It is situated in Bhowanipur Road between the Military Cemetry and Tolly's Nullah and has a good compound. It now consists of an administrative block and two large ward buildings with the necessary servants' quarters and out-houses. In the administrative block, we have an office, a combined dispensing room and laboratory, two small wards with four beds in each, an examination room, and a contractor's godown. One of the ward buildings has three wards with a capacity of 40 beds, and the other has one large ward with 30 beds.

The clientele still consists chiefly of public women, and as the hospital is well known to that community, not only in Calcutta, but throughout Bengal, there is no difficulty in keeping all the beds occupied.

From time to time we deal with women of better class and we are anxious to extend this side of the work. The two small wards in the administrative block enable us to deal with such cases without constant intermingling with the others.

The hospital expenditure is entirely borne by the Government of Bengal. The personnel consists of the Superintendent who visits twice weekly. There are two honorary workers who also visit twice weekly, viz., Dr. K. S. Roy and Dr. (Miss) S. Ghosh. The resident staff consists of one Sub-Assistant Surgeon, Dr. Situl Chandra Dutta, one compounder and one clerk. The nursing is done by four *dhais*. These have been recruited from among the patients, and I have at present four exceedingly good workers whose practical knowledge of the lesions met with is very considerable. Should we evolve some day a system of centres for the treatment of venereal disease among women throughout the city, as I hope we may, there ought to be no difficulty in finding the necessary attendants through this hospital.

The hospital provides each patient with bedding, clothing, feeding plates and diet during her stay. The food is good and provided at an average cost of about 5½ to 6 annas per head per day. We have our own cowshed so that our milk supply is under our own supervision.

As most of the patients are able to walk about, they are examined and treated in the examination room in the administrative block and no detailed bed to bed examination is required.

Some two years ago we acquired, through the sympathy of H. E. Lord Ronaldshay, a good microscope with an oil immersion lens, and this is regularly in use for diagnosing gonorrhœa and for testing smears to satisfy ourselves of the results of treatment. Recently we have introduced apparatus for carrying out the Sachs-Georgi test for syphilis and find it practicable to test all cases of doubtful diagnosis, as well as to get some idea of the state of the blood on discharge from hospital. At the same time, by special arrangement with the Serological Department, we have a great number of Wassermann tests carried out, although we have no facilities for doing this test ourselves.

The total cost of the hospital is about Rs. 30,000 per annum which works out at Rs. 385 per bed per annum or a little over

* Being a paper read at a meeting of the Medical Section of the Asiatic Society of Bengal on the 10th of October 1923.

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Re. 1 per bed per day,—a very low figure as those interested in hospital administration will appreciate.

Having thus introduced you to the hospital, I wish to give you some idea of the work done in it. I purposely avoid giving you many statistics, but, to enable you to realise the type of case dealt with, and roughly to give you an idea of proportion, I had a census taken of the cases in hospital on a day chosen at random during the preparation of this paper. There were, on that occasion, in the hospital 5 cases of soft sore, 8 cases of bubo, 18 cases of gonorrhœa, 27 cases of syphilis and 17 cases of mixed infection, i.e., gonorrhœa combined with soft sore or syphilis, or soft sore combined with syphilis, or all three together.

I propose to give you short descriptions of our experience with soft sores and buboes and more elaborate ones of our experience with gonorrhœa and syphilis.

SOFT SORES.

We see a great many soft sores, and many cases in which the lesion on the generative organs appears to be a soft sore afterwards prove to have syphilis as well. These sores are generally found on the labia majora or minora, on the clitoris or on the vaginal wall not far from the entrance. They can almost always be detected by separating the parts with the fingers. I do not recollect having seen one so far inside as to require a speculum for its demonstration.

They are usually large on admission—by which I mean about 1 in. or 1½ in. in diameter. They often have an irregular undermined edge with inflamed tissue beyond this margin, and the base is of a yellowish colour secreting a profuse discharge. These are generally accepted as being due to a specific organism. Ducrey's bacillus is believed by most authorities to be the casual agent.

A certain number of these cases are accompanied by inflammatory swelling of the groin glands at a time when the sore is the urgent indication for treatment, but many of them, and often quite extensive ones, are not accompanied by buboes, although these may develop later when the sore has healed.

In our returns for 1922 we shewed 135 cases of soft sore. Of these 18 were complicated by gonorrhœa and 98 were accompanied by syphilis. Obviously we are in the habit of diagnosing mixed infections (of chancroid and syphilis) extensively.

If you refer to McDonagh's work, you will find that he considers that a soft sore very rarely becomes a chancre. If a chancre develops on what was diagnosed as a soft sore, then the initial diagnosis was wrong. He adds that the more experienced the physician, the more rarely is double infection diagnosed. In face of this view I wonder if we are correct in our diagnosis of these mixed cases. When dealing with chancres—i.e., syphilitic sores, McDonagh describes a variety which he calls ulcerative chancre, stating that this may be a sequel of any chancre which has become secondarily infected with ordinary pyogenic organisms. Is it possible that many of the cases which we have looked upon as chancroid plus syphilis are really syphilis plus sepsis? McDonagh seems to have a clear idea in his own mind of the distinction between the ulcers found in these two combinations, but I confess I am not very clear about it myself, for the characters of a soft sore seem to me akin to those of any ulcer caused by pyogenic organisms. Of course one might hope to get something regarding the exact date of onset of a sore if the histories were reliable, but they are not, and one has to depend on the evidence of the senses.

Our bacteriological researches have not entered this field of enquiry, and my working rule is never to trust to an alleged soft sore being pure,—always look for evidence of syphilis elsewhere and have the blood tested.

In any case, such sores respond fairly well to treatment, the essential features of which I believe are rest and cleanliness coupled with a regular life and good food. We commence treatment with hip baths and follow this up with lotions, ointments and dusting powders all of which contain mercury. I omit for the present further details of the treatment of the syphilitic element in these cases. They generally take 3 to 4 weeks to heal.

BUBOES.

A study of text book descriptions shows that the term bubo is used in a wide sense to embrace almost any enlargement of glands due to venereal disease. Even in addition to enlarged glands in the groin occurring in all three venereal diseases, the term is applied to an enlarged gland nearest to an extragenital chancre.

In syphilis the term "bullet bubo" is applied to the hard shotty type of gland of that disease, and the term "giant bubo" to the enlarged gland behind an extra-genital chancre.

In gonorrhœa, authorities do not lay much, if any, stress on the condition of the inguinal glands, though Magian states that lymphadenitis is common and if neglected, goes on to suppuration. McDonagh says that 90 per cent. of gonorrhœa cases have inflammation of the inguinal glands.

In our work, we reserve the term bubo for an acute inflammatory condition of the groin glands which may or may not go on to suppuration. It may be that in some cases this is due to gonorrhœa, but as a general rule it is due to soft or septic sore. It is noteworthy

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that of the cases which come to us, the vast majority require something more than rest and fomentations, probably because they come late. Last year we dealt with 73 cases of buboes. Fifty-two of these were admitted with soft sores still unhealed. Eighteen of them had evidence of syphilis and a history of chancroid. In three the only other sign was gonorrhœa, but even here one feels that the bubo may have been due to a previous soft sore, the scar of which was not observed.

It is possible by rest and tincture of iodine and boric compresses to get absorption, but as a rule we find that some more drastic surgical procedure is necessary, as pus has formed. We have tried Harrison's method of aspirating and injecting tincture of iodine, but not with very satisfactory results. Out of 19 cases so treated, 7 were successful and 12 ultimately required incision or even excision of the glands. McDonagh teaches that suppurating buboes require only small incisions and that excision of glands is an unnecessarily severe surgical procedure. This has not been our experience. While attempting to deal with buboes by mere incisions and scraping of an individual gland, we find that later other glands of the group break down at intervals and that much time is often lost by treating the glands separately. If, therefore, the infection seems extensive, we go for excision of all the enlarged glands at once. Working on these lines I should say that about two-thirds of the cases come to excision and one-third are cured by incision.

The treatment takes 3 to 4 weeks.

GONORRHŒA.

As I have mentioned we keep about 20 beds for this disease. As all our patients are in-patients they are under constant supervision, and all treatment and manipulations are carried out by more or less skilled labour.

The main points of the local anatomy which one has to keep in mind in gonorrhœa are the vulva, including the labia and Bartholin's glands buried in these, the vagina, cervix uteri with its canal some ¾ in. in length, the uterus and Fallopian tubes wrapped up in the broad ligament, and the ovaries, and the urethra with two para-urethral ducts and two Skene's ducts.

Theoretically, gonorrhœal infection introduced into the vagina may penetrate any of the ducts mentioned. It may spread over the vulva into Bartholin's glands, into the cervix, the uterus and the Fallopian tubes. From the uterus or Fallopian tubes it may invade the surrounding tissues. It may enter the para-urethral ducts, the urethra, Skene's ducts, or the bladder, ureters and kidneys. It may become generalised in the blood stream and settle in the joints or it may be carried on fingers or towels to the conjunctival sac, and it may also penetrate the rectum.

Such is a fairly complete picture of what may happen, but for practical purposes one wants to get familiar with what usually happens and our experience may help to give you a general idea of this.

Acute gonorrhœa I must pass over, we seldom see a case. I understand it is the fairly common experience of such hospitals that the patients do not come in the acute stage.

The vast majority of the cases which we see are chronic gonorrhœas with cervicitis as the only gross complication. The patient comes complaining of profuse vaginal discharge which stains her clothing. The condition is painless. The necessary examination consists of inspection, which in these cases reveals absence of inflammation about the vulva. Thereafter a speculum is inserted, the vaginal wall may be somewhat red and congested, but no gross abnormality is seen other than the presence of one or two drachms of somewhat milky discharge which collects on the tip of the speculum and appears to come from the vaginal wall. On examination of the external os a plug of opaque muco-pus is seen protruding from the cervical canal and the os may be somewhat eroded. With the speculum still in position, the left forefinger is drawn down the anterior vaginal wall to the urinary meatus. This ought to produce a bead of pus from the para-urethral ducts if infected, or from the meatus if the urethra or Skene's ducts are infected. In these cases no bead of pus is seen. If the speculum is removed, Bartholin's glands may be squeezed and here again a bead of pus should be seen at the mouth of the duct if infected. In these cases nothing is seen. By digital examination the fornices may now be examined and the tissues are found soft and pliable, in fact normal, while bimanual examination reveals a freely movable uterus and absence of pain from the pelvic area, indicating that there is no infection of the genital tract above the cervix uteri. In the majority of cases one has to deal with a vaginal discharge plus an inflammatory condition of the cervical canal. The vaginal discharge can be markedly reduced in 3 or 4 days, but the cervical canal requires treatment for 3 or 4 weeks.

As regards complications other than the cervicitis, the commonest are varying degrees of inflammation about the vulva and perineum. Excoriations of great extent, giving very tender surfaces of exposed dermis, and secondary infection of the inguinal glands can reduce the patient to a state of abject misery. Inflammatory œdema, with or without pustular eruptions of the labia majora, and infection of Bartholin's glands are

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frequently seen. Prolonged or repeated attacks of this inflammation of the labia lead to a sort of elephantoid condition of the labia. Plastic operations were done on 31 such cases last year. Warts are fairly frequently seen in enormous numbers and of large size. Occasionally we see rectal infections which can lead to stricture. In our experience gross urethral infection is not very common, and so far I have not recognised infection of para-urethral or Skene's ducts. Cystitis I have seen rarely, but not so far as I know any kidney infections.

Perimetritis, causing a fixed painful uterus with a doughy feeling in one or more of the fornices, is frequently seen. There is great tenderness over the lower abdomen. The patients have a septic look and there is usually slight fever. Of the more far reaching effects, joint affections and ophthalmia are frequently seen, the latter both in adults and infants.

I must now say something of our efforts at treatment. We have abandoned permanganate douching as cumbersome, messy and inefficient. We tried lactic acid treatment for some time and were favourably impressed with the results, but found the preparation of fresh pessaries of streptothrix *dahi* too troublesome as we have neither the time, skill, nor facilities for preparing the cultures.

Our present routine is based on the teaching of E. R. T. Clarkson contained in a book entitled *The Venereal Clinic* and intended for the guidance of officers in charge of venereal clinics in England.

In the simple cases:—

(1) Swab the vagina thoroughly once daily for 3 days with ordinary biniodide spirit. This will materially reduce the discharge.

(2) Attend to the cervix from the 4th day.

(a) With a small pledget of cotton wool on a thin probe or stick endeavour to twist the plug of mucus out of the cervical canal.

(b) If successful, insert another swab soaked in 5 per cent. picric acid in glycerine into the cervical canal, and twist it round a few times. Some of the picric acid adheres to the cervical canal, while some flows over the lips of the os and the upper part of the vagina.

(3) Insert a plug of cotton wool, to be removed on the first attempt at micturition. Repeat this treatment every alternate day till you cease to find a plug of mucus forming. This means for 3 or 4 weeks. Then examine a swab of the cervical canal with the microscope.

The cleaning of the cervical canal is important and difficult, and if the above method fails, we try liquor potassæ to soften the plug. We have also a suction apparatus which is very useful. If the external os is too small for these manipulations, we dilate it with a modified Hegar's dilator with a collar, so arranged as to prevent the instrument being pushed through the internal os, a most undesirable result.

In cases where there is external inflammation we give hip baths and hot fomentations till the parts are sufficiently soothed to allow of the above manipulations. Abscesses must, of course, be treated by incision or even excision of the glands.

Internal inflammatory conditions usually respond well to hot douching and hot applications to the lower abdomen. For joint lesions we purchase stock vaccines and use them, we think with fair success.

Having made satisfactory progress since the days of permanganate douching, we are now devoting more attention to the discovery of minute collections in the small ducts and hope to make a habit of dealing with these while we are treating the gross lesion of the cervix.

You will readily appreciate that it is very difficult to keep our patients after they have decided that they are cured, which means to them that they are comfortable and free from discharge sufficient to stain the clothing. So it is useless at this stage to talk of scientific standards of cure. Though our methods are not yet perfect or exhaustive, these measures can relieve an immense amount of distress and check a considerable amount of disease. I think most of what I have described is practicable to those general practitioners who take an interest in cases of this class.

Diathermy is reported to be very effective in removing infection from the cervix and urethra, curing in 10 to 14 days, but as we have no electric connection, far less the special apparatus and machinery needed, we cannot expand on this line at present.

SYPHILIS.

For syphilis, we usually have about 40 beds in use. The possible ravages of syphilis are so extensive that it is out of the question to refresh your memories with even a synopsis of the subject. We will have to be content to start from the elementary grouping of primary, secondary and tertiary syphilis and syphilis of the nervous system.

All our cases come within the groups secondary and tertiary and are principally in the former group.

The earliest cases that we see have chancres with enlargement of, at least, the inguinal glands.

Then come cases with condylomata in which the primary sore may or may not still be present.

Then come cases with skin eruptions, and finally the tertiary cases with ulcers and periosteal gummata.

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Among the earliest cases with chancre and enlarged inguinal glands, the most striking feature to be learned is the comparative rarity of simple infection with the *Spirochæta pallida*. A novice after reading text-books is very apt to expect that he will find on examining the genitalia a clear picture,—that a discharge means gonorrhœa, a small papule, possibly ulcerated, means syphilis, and one or more extensive ulcers means chancroid. One is soon disillusioned What one finds on first inspection can only be characterised as a most awful mess. A little thoughtful analysis will make one realise that the elements of this are discharge, inflammatory swelling and ulceration, and it is up to the examiner to decide how much of this is due to the gonococcus, to Ducrey's bacillus, to the *Spirochæta pallida*, or to various common pyogenic organisms superadded. In our experience gonorrhœa frequently occurs alone, chancroid occurs alone or accompanied by gonorrhœa or by syphilis. Syphilis relatively seldom occurs alone. It is often accompanied by gonorrhœa, chancroid, or sepsis.

The figures of last year will give you some idea of our experience.

(*a*)	Gonorrhœa alone	.. 218
(*b*)	Chancroid alone	.. 117
(*c*)	Syphilis alone (including rashes)	77
(*d*)	Gonorrhœa with chancroid	18
(*e*)	Do. with syphilis	.. 123
(*f*)	Chancroid or sepsis with syphilis	98
(*g*)	Gonorrhœa, chancroid and syphilis	26

that is to say 56 per cent. of gonorrhœas were uncomplicated, 45 per cent. of chancroids were uncomplicated, but only 23 per cent. of syphilis were uncomplicated.

Syphilis alone is comparatively easy to identify for you have the small, possibly ulcerated, papule supported by hard discrete glandular enlargement in the inguinal region and possibly also in the neck, axillæ and elbows. Theoretically one may also have ulceration of the throat and falling of the hair, but we seldom find either evidence or history of these two conditions. Syphilis superadded to chancroid or accompanied by sepsis however is an entirely different matter. Locally and in the groin the chancroid or septic infection predominates, and you have to make up your mind whether the large ulcer has any trace of induration in its base—a very difficult matter in practice. In the groin, the matting of the glands due to chancroid infection completely masks any evidence of syphilis there, and clinically one has to consider the hard shotty glands found elsewhere with the throat condition or falling of hair. These are all doubtful points in any particular case. Glands may be enlarged from other causes, and there may be no evidence in throat or scalp. In this group of cases no eruption has yet appeared. It is in these cases particularly that we have recourse to the Sachs-Georgi and Wassermann tests for diagnostic purposes.

Passing now to the second group of cases, namely those shewing condylomata, quite a number of these come to us. The condylomata are much larger than as ordinarily seen in the male and may extend from the front of the abdomen to the labia majora and back across the perinæum to behind the anus. I sometimes feel doubt as to whether I am dealing with true syphilitic condylomata or with gonorrhœal warts for either of which there may be cause in a particular case. The warts or condylomata accuminata of gonorrhœa are described by Rawlins in Clarkson's book *The Venereal Clinic* as characterised by having small finger-like processes on their surfaces which true condylomata do not have. Malcolm Morris expresses the idea thus: "The difference between warts and condylomata is that while in the former the overgrown papillæ are free, in the latter they are welded into a coherent mass by swelling of the intervening tissue." These descriptions give a good standard to differentiate between the two and incidentally satisfy me that I am not the only person who has felt doubt in a particular case.

Turning now to the group characterised by eruptions, according to the books, the earliest are of the roseolar type. These we seldom see; no doubt as it does not worry the patient, she does not present herself at this stage. Then come the localised patches of papular eruptions which may pass on to vesicular or pustular eruption or may have a squamous character and what are described as rupioid.

These are all types which we see fairly often. One, the papule-pustular type, I think needs special remark. It is not infrequently so pustular as to make one stand back and enquire about the possibility of small-pox. I have frequently thought of this and, on the other hand, we have found small-pox thrust upon us in the belief that it was secondary syphilis. I mention this particularly because Hutchinson says a syphilitic eruption looking like small-pox is very rare, yet the knowledge of its possible occurrence is of extreme importance. Malcolm Morris says that sometimes, though very rarely, vesicles are formed, or suppuration may supervene and give rise to pustules. Clarkson, so far as I see, does not mention it at all. I warn you that this particular type of eruption requires more attention, in Calcutta at least, than some of these remarks seem to imply.

And now with regard to tertiary lesions I need say little. It is chiefly the tertiary ulcers that seek admission to the Voluntary Venereal Hospital, and occasionally periosteal

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gummata. I imagine that other tertiary lesions, not being recognised as syphilis by the public, find their way into the general hospitals, if they come for treatment at all.

The same applies to syphilis of the nervous system.

Treatment.—The treatment of syphilis is another subject so extensive as to make few remarks seem very inadequate, but all I can do here is to give the history of treatment and the present practice in the Voluntary Venereal Hospital.

We may neglect all history prior to the introduction of organic arsenic as no longer of practical interest.

In 1917 the late Lieut.-Colonel Sutherland visited the hospital and through his influence a gift of 100 doses of novarsenobillon was obtained from a Marwari gentleman named Sunder Mull of Giridih. About the same time, the influence of the Royal Commission's report began to be felt. The Government of Bengal increased the annual allotment for medical and surgical equipment so as to allow of an expenditure of Rs. 1,800 to Rs. 2,000 on organic arsenic.

From 1917 to 1920 the treatment consisted of giving 3 doses of N.A.B., 0.45, 0.6, 0.9 gm. at weekly intervals. This was accompanied on alternate days by intramuscular injections of a soluble mercury salt, viz., ammonio-mercuric chloride—gr. ½ in 10 minims of water.

Not satisfied that the organic arsenic was sufficiently prolonged and dissatisfied with the frequent repetitions of mercurial injections and also having procured a grant for literature, we purchased Harrison's *Diagnosis and Treatment of Venereal Disease in General Practice*, and altered our scheme to that indicated on page 418 of this book, viz.;—

Weekly injections as follows:—0.45, 0.45, 0.6 gm.; interval; 0.6, 0.6 gm.; interval; 0.6, 0.6 gm., and on the mid-day of each week an intramuscular injection of mercurial cream representing 1 gr. of mercury in each dose.

This scheme Harrison recommends for early primary cases in which the Wassermann test is still negative and he recommends further courses for more advanced cases. We have not been able to follow his ideal as the patients would neither wait so long nor return for further treatment.

Finding in Harrison a strong advocate of intramuscular as opposed to intravenous injection of 914 we adopted this plan in the winter of 1920-21. The arguments are, though somewhat painful it is tolerable, and the drug is more slowly absorbed and more slowly excreted, and these are taken to mean greater safety and greater therapeutic effect.

I was at Home in 1921 and found that although Harrison advocated intramuscular injections, he did not seem to have the majority of syphilologists with him in this, and on my return I did not press it as I found it had been given up in my absence. It is obviously distressing to the patient, if not actually painful, and the intravenous method is simple enough. Therapeutically I don't think we appreciated any difference in effect in the two methods.

Under such treatment as used to date, the obvious symptoms cleared up rapidly but there were not infrequently cases of poisoning both with arsenic and with mercury. So much so that Assistant Surgeon Rash Mohan Bose was able, from practical experience, to write quite a useful article on arsenical poisoning during the treatment of syphilis which appeared in the *Indian Medical Gazette* of September 1920. Though interesting by way of experience, this was not satisfactory as we had more than one death.

Realising that Harrison's doses were based on experience of soldiers with an average weight of 10 stone, I had all the patients in our hospital weighed and discovered that we were working on an average weight of 6 stone.

I, therefore, modified the dosage but kept to the scheme, with much better results, that is with no obvious loss of efficiency we got an almost complete disappearance of poisoning. We only saw a few cases of mild jaundice and one case of exfoliative dermatitis.

But we could not yet be satisfied, for this treatment meant 9 weeks' stay in hospital and our patients would not submit to this, so we still searched for some more suitable scheme, and in July 1922, we got Clarkson's *Venereal Clinic* where we found the following scheme recommended:—

Four weekly injections of N.A.B. with weekly intramuscular injections of mercury for 8 weeks. This is for early cases, and is to be repeated for more advanced cases.

This course we have found more practicable here. The patients stop for 4 weekly injections of N.A.B., during which they also have mercurial inunction on alternate days and take away with them mercurial ointment for another month.

While working on these lines my attention was called to Stabilarsan, and I may say at once that this is the preparation which I prefer so far. It is 606 in glucose prepared in an ampoule for intravenous injection, and as the manufacturers are so careful to have only fresh supplies on the market that it is difficult to procure, I trust the ampoules thoroughly. It is simple to use, reliable and about the same price as other preparations. It appears to me to be quite as efficient as N.A.B., perhaps more so and much more easy to use, and we use it on the same scheme as Clarkson recommends. In either case we get no signs of poisoning.

With regard to the administration of mercury, the alternatives are oral

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(i.e., hydrag. c. creta), inunction (ung. hydrargyri), intramuscular injection of an insoluble preparation (mercurial cream) or of a soluble one (ammonio-mercuric chloride).

It is generally agreed that oral administration is the least reliable and should be used only where the circumstances of the patient preclude other methods. The injection of a solution is open to the objection that it means frequent attendance by the doctor. The injection of a suspension of mercury is widely used and is effective, but we have found that it is open to objection in that cases of poisoning occur. As at one fell swoop, you have given a week's supply, the poisoning may be severe.

I prefer inunction for our purposes. We give it on alternate days. It suits our circumstances, where we can have a regular parade in which each patient does her own inunction under supervision. At the moment that a patient shews signs of poisoning we can stop the treatment and arrest the progress of the poisoning. We used to see a good deal of poisoning when we were using intramuscular injections of cream, but now we arrest the drug on evidence of salivation and so avoid more serious symptoms.

Before leaving the subject, I would like to make quite sure that you appreciate our present position in the treatment of syphilis. Theoretically the system consists in using either N.A.B. or Stabilarsan in 4 weekly injections. This takes a month. During this and the succeeding month, the patient has mercury. An interval of 2 months should then be allowed to elapse and then the Wassermann or Sachs-Georgi test should be made. If positive, the treatment should be repeated. If still positive, it should be repeated a third time. Thereafter, failures, according to Clarkson, should be treated simply with potassium iodide and mercury.

Practically, up to the present time we have been baulked in carrying out the system by the refusal of our patients to stay more than one month. Hence in our practice they get four weekly doses of N.A.B. or Stabilarsan with mercurial inunction running concurrently, and we hope that they will accept the facilities for another month of mercurial inunction. You will see that our latest chance for a Wassermann reaction comes at the end of one month's treatment. Such tests are of little value as a test of disinfection, so I purposely do not discuss the statistics. In the meantime, the symptoms all clear up, the patients look well and happy and are for the time being in good health. They go out for the most part, I fear, to return to the houses of ill-fame from which they have come. Some of our cases were pregnant and no interference with the condition was observed.

In these circumstances, you will appreciate that relapses or reinfections are frequent, and the following figures for 1922 will give you some idea of what happens.

Total admissions for syphilis	324
Cases unknown to us previously	196
Cases recognised as having been treated for syphilis previously in the institution	128

Nearly 40 per cent. of our syphilitics were cases we had previously treated for syphilis.

This I think will emphasise in your minds the importance of not resting content with a single short course of organic arsenic if you can by any means persuade your patients to go through repeated courses with due attention to the Wassermann reaction.

In conclusion, it would be discourteous of me not to acknowledge the assistance of Sub-Assistant Surgeon Sital Chandra Dutt in the preparation of the clinical portion of this paper and of the clerk of the Voluntary Venereal Hospital in the historical portion.

A NOTE ON THE SEROLOGICAL DIAGNOSIS OF TYPHUS BY THE WEIL-FELIX REACTION.

By E. S. PHIPSON, D.S.O., M.D. (Lond.), D.P.H., D.T.M. & H.,
MAJOR, I.M.S.,
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THE recent occurrence of an outbreak of typhus in Simla has afforded me an opportunity of testing the value of the Weil-Felix reaction in the diagnosis of this disease as it occurs among Indians, and a full account of the outbreak and of the experimental investigations carried out in connection with it appeared in the *Indian Journal of Medical Research* for July 1923.* The reaction as a diagnostic method in Indian cases has proved, however, in my experience of such great practical value that it may be of interest to place on record in the *Indian Medical Gazette* a summarised account of the outbreak and of the results of the Weil-Felix reaction.

ABSTRACT.

The outbreak consisted of sixteen cases (8 males and 8 females) of which six ended fatally. The cases were limited to a single Mohamedan family of vegetable sellers, and with two exceptions all were blood-relations, a fact of some significance in a louse-borne disease.

The first three cases of the series were fatal and the disease was not recognised during life. When, however, further cases developed, enquiry shewed that some disease was

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occurring among relatives of the three cases which had died, a fact which suggested an infectious origin. Bacteriological examinations for relapsing fever, malaria and enteric group diseases gave a negative result, and the blood of two recently *recovered* cases was then taken and tested for agglutination with *B. proteus X 19* with a positive result, indicating that the disease from which they had just recovered was almost certainly typhus fever.

The clue to the nature of the disease having thus been afforded by the serological reactions of the two recovered cases, the remaining cases were placed under close observation and the diagnosis definitely established.

The origin of the outbreak was not known with certainty, but the virus was undoubtedly imported from outside Simla. The available evidence pointed to the infection having been introduced from the town of Suni, the capital of Bhajji State, some 26 miles by road from Simla. At the time when the infection must have been introduced, a limited outbreak of what was believed to be typhus was in progress in Bhajji State. This outbreak coincided in point of time with the season for gathering limes for which the Suni neighbourhood is well-known. During the lime season there is a brisk traffic between Suni and the Simla market, and there were some reasons for connecting the lime sellers who brought in the fruit to Simla, on the one hand with the Suni family who were stricken with the fever resembling typhus, and on the other hand with the first case of the Simla series, who was himself a vegetable seller by trade, the inference being that infected lice were brought to Simla by a healthy human intermediary.

The clinical features of the outbreak did not greatly differ from those recorded in the Indian outbreak described in the *Indian Medical Gazette* for June 1908 by Husband and MacWatters, and a clinical description of the comparatively few cases under detailed observation is therefore hardly necessary.

It may, however, be desirable to comment briefly on those clinical features which possess diagnostic importance.

(1) The *facies* of the patient is in many cases characteristic.

The flushed face with some conjunctival injection, the vapid expression coupled with slow cerebration, are very suggestive of alcoholism.

(2) The type of *fever* in the milder forms of typhus is hardly characteristic but it is possible to discern some points of similarity in the examples given in the charts. In all cases defervescence was by lysis lasting 2 or 3 days. In several of the cases there was a well-marked remission in temperature a few days before the beginning of the defervescent period.

(3) The *rash* in the Simla cases was made out in all the 6 cases which came under detailed observation. In only 2 cases was it in any degree obvious, and in most of the cases it was so scanty and indistinct that it would certainly be overlooked unless specially sought for. The earliest manifestation of the rash took the form of discrete macules about 2 to 4 mm. in diameter, first of the same colour as the surrounding skin and almost invisible, except that by oblique illumination they are seen to be raised to a minute extent above the general skin-level. The macules as they develop acquire a pinkish tint, turning later to a purple or purple-brown hue, and finally disappear in about a week. The rash was most easily made out on the inner sides of the arms and bend of the elbow, where the skin is finer in texture and less pigmented. It was also seen on the back, chest, neck, and other parts of the body. Careful cleansing of the skin is an essential preliminary, and the application of oil to the clean dry skin surface was found to assist materially in making the rash more clearly visible, by increasing the transparency of the outer layers of the epidermis. No true petechial eruption was observed, and no "water-course" erythema as described by some writers could be made out.

(4) The pulse rate of all the cases, as will be seen from the charts, ranged very high, a diagnostic point emphasized by Husband and MacWatters.

(5) One negative feature is worthy of mention. None of the cases shewed jaundice nor even icteric tinging of the conjunctivæ, which is so common in relapsing fever.

(6) The convalescence was rapid and quite unlike the long and tedious convalescence after relapsing fever.

The technique of the Weil-Felix reaction.—The technique of this reaction is quite simple. It consists of an agglutination reaction between the serum of a suspected case and a bacillus of the *proteus* group originally isolated from the urine of typhus cases, and named *B. proteus X 19*. Other strains of *B. proteus* have been similarly isolated and are said to possess a greater degree of agglutinability with typhus sera, but the X 19 strain used in this investigation was found to be quite satisfactory. The reaction is not, according to most authorities, truly specific, but the organism nevertheless retains its agglutinating properties unimpaired after years of sub-cultivation. It grows abundantly on ordinary agar and emulsifies readily.

Any method, microscopic or macroscopic, may of course be employed in demonstrating the agglutination reaction. The method which I usually employ and employed in this investigation is the macroscopic method with Garrow's agglutinometer. The method lacks

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Statement showing results of the Weil-Felix Reaction in the Simla Outbreak.

Serial No.	Name.	Age.	Sex.	Relationship.	Date of Onset.	Issue of Case.	Duration of Fever.	Interval between onset of disease and examination of blood.	Agglutination with *B. Proteus* X19. Dilutions of Patient's serum. 1/4	1/8	1/16	1/32	1/64	1/128	1/256	1/512	1/1024	1/2048	1/4096	Remarks.
1	Salim ..	48	M	Uncle	10-11-22	D 30-11-22	..	..	..	..	..	..	..	..	..	..	..	..	..	These cases not seen during life. Diagnosis presumptive.
2	Muna ..	55	M	Father	11-12-22	D 26-12-22	..	..	..	..	..	..	..	..	..	..	..	..	..	
3	Mumta ..	20	F	Daughter	13-12-22	D 26-12-22	..	..	..	..	..	..	..	..	..	..	..	..	..	
4	Dilbur Hussain	12	M	Son	29-12-22	Recovered	? 15 days	19 days	+	+	+	+	−	−	−	−	−	−	−	The two original cases whose sera, after recovery, gave the clue to the nature of the disease.
								62 days	+	+	+	−	−	−	−	−	−	−	−	
5	Mohd. Ghaffur	14	M	Son	29-12-22	Recovered	? 15 days	19 days	+	+	+	+	+	−	−	−	−	−	−	
								62 days	+	+	−	−	−	−	−	−	−	−	−	
6	Amiruddin	13	M	Son	1-1-23	D 16-1-23	..	..	..	..	..	..	..	..	..	..	..	..	..	Not seen during life.
7	Fatma ..	22	F	Daughter	9-1-23	Recovered	21 days	12 days	+	+	+	+	+	+	+	+	+	−	−	Case complicated with broncho-pneumonia. *? Accidental destruction of agglutinins by error in technique.
								25 days	+	+	+	+	+	+	+	+	−	−	−	
								39 days	+	+	+	+	+	+	−	−	−	−	−	
								47 days	+	+	+	+	+	+	−	−	−	−	−	
								56 days	*±	−	−	−	−	−	−	−	−	−	−	
								72 days	+	+	+	+	−	−	−	−	−	−	−	
8	Abdul Majid..	20	M	Son	14-1-23	D 21-1-23	..	4 days	+	−	−	−	−	−	−	−	−	−	−	Died before agglutinins could develop.
9	Saliman ..	50	F	Mother	17-1-23	D 23-1-23	..	..	..	..	..	..	..	..	..	..	..	..	..	Not seen during life.
10	Khurshida ..	16	F	Daughter	20-1-23	Recovered	15 days	6 days	+	+	+	+	+	+	−	−	−	−	−	
								16 days	+	+	+	+	+	+	+	−	−	−	−	
								30 days	+	+	+	+	+	−	−	−	−	−	−	
								38 days	+	+	+	−	−	−	−	−	−	−	−	
								46 days	+	+	+	−	−	−	−	−	−	−	−	
11	Zohra ..	3	F	Gr. daughter	24-1-23	Recovered	11 days	8 days	+	+	+	+	+	+	−	−	−	−	−	
								14 days	+	+	+	+	+	+	+	−	−	−	−	
								28 days	+	+	+	+	+	−	−	−	−	−	−	
								35 days	+	+	+	−	−	−	−	−	−	−	−	
12	Zobeda ..	6	F	Gr. daughter	24-1-23	Recovered	9 days	8 days	+	+	+	+	+	+	−	−	−	−	−	
								14 days	+	+	+	+	+	−	−	−	−	−	−	
								28 days	+	+	+	−	−	−	−	−	−	−	−	
								35 days	+	+	−	−	−	−	−	−	−	−	−	
13	Ghafuran ..	18	F	....	27-1-23	Recovered	13 days	7 days	+	+	+	−	−	−	−	−	−	−	−	This case was admitted to the local Dufferin Hospital and regarded as a case of enteric fever. The second specimen of blood (14th day) settled the diagnosis. She was a contact of the other cases.
								14 days	+	+	+	+	+	+	+	+	+	+	−	
								19 days	+	+	+	+	+	+	+	+	+	−	−	
								27 days	+	+	+	+	+	+	+	+	+	+	−	
								32 days	+	+	+	+	+	+	+	+	+	−	−	
								39 days	+	+	+	+	+	+	+	+	−	−	−	
								46 days	+	+	+	+	+	+	+	−	−	−	−	
								56 days	+	+	+	+	+	+	−	−	−	−	−	
14	Mohd. Shafi ..	23	M	Son	30-1-23	Recovered	15 days	6 days	+	+	−	−	−	−	−	−	−	−	−	
								8 days	+	+	+	+	+	−	−	−	−	−	−	
								14 days	+	+	+	+	+	−	−	−	−	−	−	
								19 days	+	+	+	+	−	−	−	−	−	−	−	
								30 days	+	+	+	+	+	−	−	−	−	−	−	
								42 days	+	+	+	+	−	−	−	−	−	−	−	
								53 days	+	+	−	−	−	−	−	−	−	−	−	
15	Hamida ..	13	F	Gr. Niece	6-2-23	Recovered	? 12 days	15 days	+	+	+	+	+	+	+	−	−	−	−	Diagnosed after recovery. A contact of the other cases.
16	Mohammed ..	45	M	Husband of No. 7	16-2-23	Recovered	11 days	5 days	+	+	+	−	−	−	−	−	−	−	−	
								7 days	+	+	+	+	+	+	−	−	−	−	−	
								12 days	+	+	+	+	+	−	−	−	−	−	−	
								20 days	+	+	+	−	−	−	−	−	−	−	−	
									1/4	1/8	1/16	1/32	1/64	1/128	1/256	1/512	1/1024	1/2048	1/4096	

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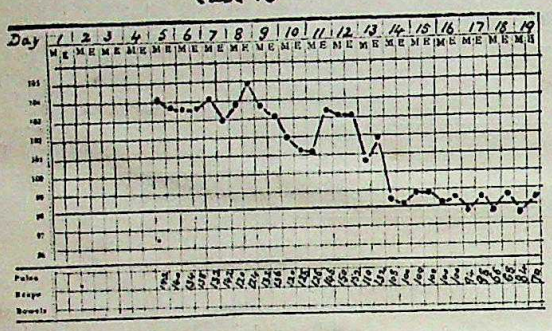
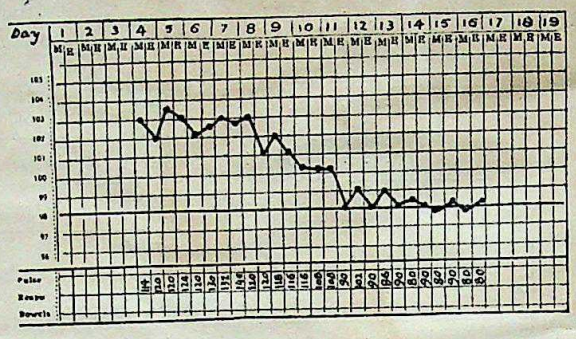
perhaps the scientific precision of Dreyer's technique, but it is very economical in time and material and quite accurate enough for diagnostic purposes. The results of the agglutination experiments are recorded in Table I. It is necessary to state that in this table no distinction is drawn between complete and incomplete reactions; the symbol "+" represents *any* recognisable degree of agglutination which can be made out with a hand-lens after 9 minutes rotation of the glass slab of the agglutinometer at room-temperature.

The sera of 12 cases known or suspected to be suffering or to have suffered from typhus gave a positive reaction in dilutions varying from 1:16 to 1:2048, with one exception, an almost moribund case whose serum was tested only once on the 4th day of the disease. Every case which gave a reaction in a dilution of 1:32 was either demonstrably a case of typhus or very strong grounds existed for regarding the case as suffering or as having recently suffered from the disease. The table also shews that the agglutinative power of the blood persists for a considerable time after recovery; not so long as in the enteric group infections but long enough, nevertheless, to enable one to arrive at a retrospective diagnosis up to several weeks after recovery from the disease, a point of some importance in investigating outbreaks of obscure fever, if, as in the Simla outbreak, the investigation is started during a temporary lull in the epidemic.

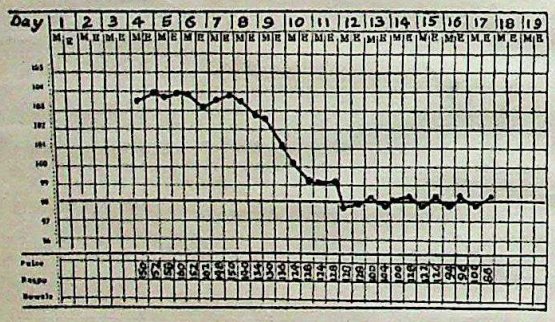
Case 10



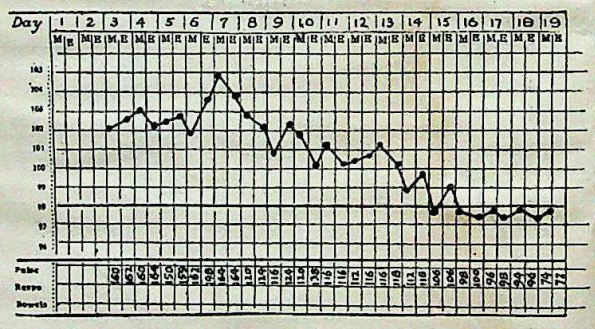
Case 13.



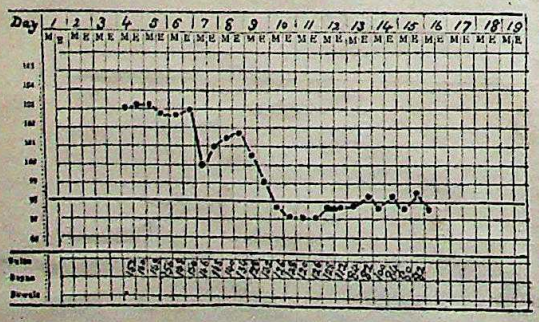
Case 11



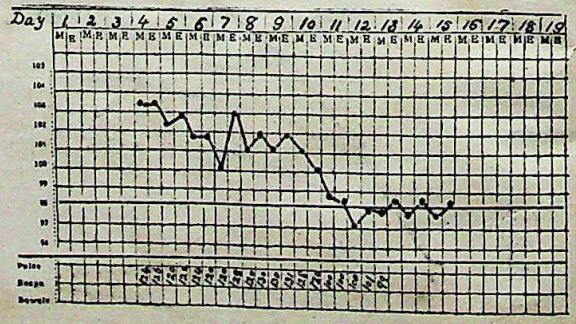
Case 14.



Case 12.



Case 16



Control experiments with non-typhus sera.—In the Widal reaction it is well known that normal sera may possess some degree of agglutinating power for the particular organism against which the serum is being

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tested. The Weil-Felix reaction is no exception to this rule, and it is of importance to know within what limits normal sera may react with *B. proteus X* 19. To arrive at a tentative conclusion on this point a series of 100 normal sera, mostly from lice-infested coolies, were examined with the following results:—All failed to shew the least trace of agglutination in a dilution of 1:16; 8 per cent. gave a feeble reaction in 1:8; 33 per cent. reacted in 1:4, and 59 per cent. failed to react at all in 1:4.

CONCLUSIONS.

The Weil-Felix reaction in Indians is of value (a) in confirming a diagnosis arrived at by clinical observation, (b) in establishing a diagnosis in typical cases in which the clinical evidence of typhus is doubtful, and (c) in arriving at a retrospective diagnosis in cases which have recovered, provided the interval since recovery is not too great.

My experience with the reaction in the Simla outbreak suggests that, employing Garrow's technique in the manner described above, a positive reaction in a serum-dilution of 1:32 and upwards is, for practical purposes, diagnostic of typhus fever. Further observations in other outbreaks and by other methods will be necessary before a definite standard can be arrived at for use in Indian epidemics of typhus.

ON A PSEUDO-ORGANISM IN THE BLOOD IN DENGUE.

By R. KNOWLES,

MAJOR, I.M.S.,

and

S. A. S. BIRAJ MOHAN DAS GUPTA, L.M.P.,

From the Protozoology Department, Calcutta School of Tropical Medicine.

Introduction.—The view that dengue is a spirochætal disease is one which has been entertained by many workers, although the arguments upon which such a theory rests appear to the writers to be but slender. Owing to its rather distant resemblances to yellow fever, to icterohæmorrhagic jaundice and to the relapsing fevers; to its proved *Aëdes* (*Stegomyia*) transmission (Cleland, Bradley and McDonald, 1916; and Chandler and Rice, 1923) and possible *Culex* transmission (Graham, 1903; Craig, 1907); to the very considerable volume of experimental work upon the virus of dengue attended with negative results,—which might be compatible with the presence of a leptospira in the blood in very scanty numbers only; a view appears to be prevalent that the causative micro-organism of dengue is probably a spirochæte.

The positive findings in favour of such a view up to the present date are as follows:—

(1) Couvy (1921), in the 1920 epidemic in Beyrout saw five or six times very scanty spirochætes in the blood on dark ground examination of dengue cases one to two hours *before* the onset of fever. He described the organism as an extremely thin spirochæte with tapering ends and with only 2 to 3 turns.

(2) Couvy (1922), in a second epidemic in 1921 in Beyrout again found the same spirochæte in the blood of dengue cases, not only before the onset of fever as in 1920, but at from 3 to 48 hours after the febrile onset. The blood of dengue cases was inoculated into rabbits; fever of a dengue type followed with the same spirochætes present in the animals' blood during both the primary fever and the secondary rise of temperature. The spirochæte was passaged from rabbit to rabbit. In some areas neither *aëdes* nor culex mosquitoes were present, and his experiments incriminate *Phlebotomus pappatasii* as the insect carrier in connection with the epidemic.

(3) Lieut.-Colonel J. W. D. Megaw, I.M.S., in 1921 found on dark ground examination of blood taken from a typical case of dengue during the first few hours of the disease one single form representing a leptospira. This observation was not published, as it was a solitary finding only, but was mentioned in a footnote to his 1923 paper (Megaw, 1923). Thanks to Colonel Megaw's kindness we are here able to reproduce a sketch taken at the time of the appearances presented by this organism (figure 1).

(4) If we accept Colonel Megaw's views, (Megaw, 1923)—that sandfly fever and dengue are essentially fevers of the same clinical type and should be classified as sandfly-dengue and mosquito-dengue respectively, then we may here include the finding by Couvy (1921) of a spirochæte in the blood of two cases of sandfly fever at 3 and at 24 hours after the onset of the fever, with successful passage of the virus to a rabbit who contracted fever and shewed spirochætes in its blood at the time of onset of the fever. Also the findings by Whittingham (1922) on sandfly fever in Malta. Spirochætes were found on dark ground examination of direct blood cultures in 6 out of 26 cases, and three primary strains were established in sub-culture.

We are a little doubtful, however, to what extent the view that dengue and sandfly fever are the same disease can be accepted, and it is to be noted that Whittingham's organism differed entirely from Couvy's spirochæte of dengue, the former "being morphologically indistinguishable from *Leptospira icterohæmorrhagiæ*, the average length being 10 to 15 μ."

(5) Vervoort (1922), during an epidemic in the Dutch East Indies of an acute fever of benign type associated with rheumatoid and vaso-motor symptoms and occasionally with a terminal rash and jaundice, isolated in five cases a spirochæte resembling *L. icterohæmorrhagiae* and *L. hebdomadis* in blood films, in cultures, and once in an inoculated guinea-pig. Guinea-pigs proved very susceptible to the infection. Whether Vervoort was dealing with dengue or not we cannot say,

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but the symptoms described are suggestive of dengue.

(6) van de Velde (1923), working in Sumatra, found a leptospira resembling *L. hebdomadis* in the blood of 23 out of 430 cases of an unclassified fever. The author notes, however, that only two of the cases shewed symptoms suggestive of dengue.

The experimental evidence that dengue is a spirochætal disease therefore rests chiefly upon Couvy's findings. On the other hand the experimental evidence *against* the spirochætal hypothesis is very strong. Apart from the large volume of earlier work with completely negative results, one may instance the work of Koizumi, Yamaguchi and Tonomura (1917) in the 1915 epidemic in Formosa. These workers proved the infectivity of the blood in even as small an amount as 0.00005 mil. but failed to find any micro-organism. Finally Chandler and Rice (1923), working in a Texas epidemic, "made every effort to find such an organism (leptospira) if it were present." They examined 250 preparations from 70 cases by dark ground examination and numerous stained slides, but found nothing. In a few cases the urine was centrifuged and examined, but with negative results. Strenuous efforts to discover a leptospira by cultural methods and all attempts to infect experimental animals were with negative results. They proved transmission by *Aëdes (Stegomyia) ægypti*, but failed entirely with *Culex quinquefasciatus*. The incubation period of the disease after the bite of an infected mosquito varied from 4 to 6½ days. This most carefully controlled and thorough enquiry led these workers to the conclusion that there is no real evidence that dengue is a spirochætal disease and that its analogies with yellow fever have been over-emphasised.

Under these circumstances, and in view of the entirely contradictory character of the findings and views prevalent, we determined during the 1923 epidemic of dengue in Calcutta to lay aside all other work as far as possible for the time being, and to seize upon this opportunity to investigate the facts. Our results may be of some interest, as for a period of several weeks we were almost assured that we had isolated a true leptospira as the micro-organism of dengue, but the final and cumulative weight of the experimental findings, and especially those in the controls, force us to the conclusion that the forms observed were artifacts of a new and puzzling character. We may add that Chandler and Rice's paper did not come to hand until nearly the conclusion of our enquiry, which lasted from July the 25th to September the 30th, 1923.

The Calcutta Epidemic of 1923.—The dengue epidemic of 1923 in Calcutta was one of the worst that the city has ever experienced. From July to the end of September, Calcutta was almost prostrated by the disease. Probably some 40 per cent. of its inhabitants suffered from one or more attacks of dengue during this period. Thus at the University Students' Hostel, out of 260 students in residence no less than 165 went down with dengue. The *economic importance* of dengue is very considerable. Every case contracted means the loss of one week of working time by the individual, to say nothing of the after-effects and impaired working efficiency; and the epidemic must have cost Calcutta city, and its mercantile community especially, some lakhs of rupees in time and labour lost.

It would appear, further, that the Calcutta epidemic was but part of a more widespread pandemic. Bombay suffered severely in March to May, 1923; Lucknow and Delhi were suffering severely in September: the whole countryside around Calcutta within a radius of 40 miles was affected, and isolated cases—mostly among new arrivals from Calcutta—were reported in such hill stations as Ranchi, Shillong and Darjeeling.

The clinical aspects of the epidemic it is for other writers to deal with. The fever usually lasted for 3 or 4 days only without a secondary rise; but such secondary rise about the (5th or 6th ?) 7th day was seen in some 20 per cent. of the cases. The rash, coming out on the 4th day as the temperature fell, was well seen in many cases and was even followed by superficial desquamation. The joint pains were intolerable in some cases and tended to persist, together with some swelling of the ankles, for weeks together in convalescence. What was especially noticeable was the special tendency to relapses (? re-infections) in the same individual. Thus person after person would suffer from two or even three attacks of dengue during the three months, and the second or third attack might prove more severe than the first. Of immunity acquired during the actual dengue season itself there was but little clinical evidence. On the other hand certain individuals who had contracted dengue in previous years escaped scot free; and it would appear that the immunity-response to dengue is but slowly acquired over a period of some months, but that when acquired it may be very real. Possibly the virus of dengue may pass out of the blood stream at a very early stage of the disease into the connective and ligamentous tissues, to remain there for a period of some weeks or months, slowly dying out, responsible for the after-pains, but also acting as a slow and cumulative antigen. Any such hypothesis, however, must await proof or disproof until the causative organism has been discovered.

We had no lack of clinical material for the enquiry; indeed the enquiry itself was hampered by attacks of dengue among the laboratory personnel. In the Carmichael Hospital for Tropical Diseases some 30 per cent. of general in-patients contracted dengue in addition to their primary disease. Day after day kala-azar cases who had had a normal temperature for weeks and were well on the way to cure would suddenly go down with dengue and look pictures of misery. Two malaria patients,—one a benign tertian and the other a quartan,

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as proved by blood examination—contracted dengue within 20 days of their last malarial rigor, although at the time on full cinchona treatment. In a third instance a laboratory worker at the School contracted a severe attack of dengue, recovered, and three weeks later went down with benign tertian malaria, trophozoites and schizonts of *P. vivax* being present in his blood. We mention these three cases because of the view entertained in some quarters (Ingram Johnson 1921, 1923), that in some vague way dengue and malaria are antagonistic diseases. In one instance an infant three days old contracted dengue, the mother also going down with the disease within a few hours of its onset in her infant.

The personnel and establishment at the School and Hospital suffered wholesale from dengue, and durwans, animal attendants, ward boys and sweepers would visit the laboratory to be bled within the first 4 to 6 hours of the onset of fever and symptoms.

Direct Blood Examinations.—The blood of 32 typical cases of dengue was examined by the following technique:—

(*a*) Air dried and Leishman-stained films were searched. No parasite of any type was encountered.

(*b*) Under aseptic precautions a small drop of blood was mixed on a thin glass slide with a larger drop of sterile citrate saline, covered with a thin cover slip, the preparation ringed with vaseline and searched under dark ground examination for not less than 15 to 20 minutes. Examination was with a Leitz 1|12th inch oil immersion lens with funnel stop and No. 6 periplanatic ocular; the No. 15 periplanatic ocular being substituted if anything suspicious was encountered. In most cases two such preparations were searched from each patient, in many from 4 to 6 per patient.

The results were that in 10 out of these 32 cases there were found in very scanty numbers motile forms which appeared to be typical leptospiræ. They varied in hardly any particular other than length. They seemed

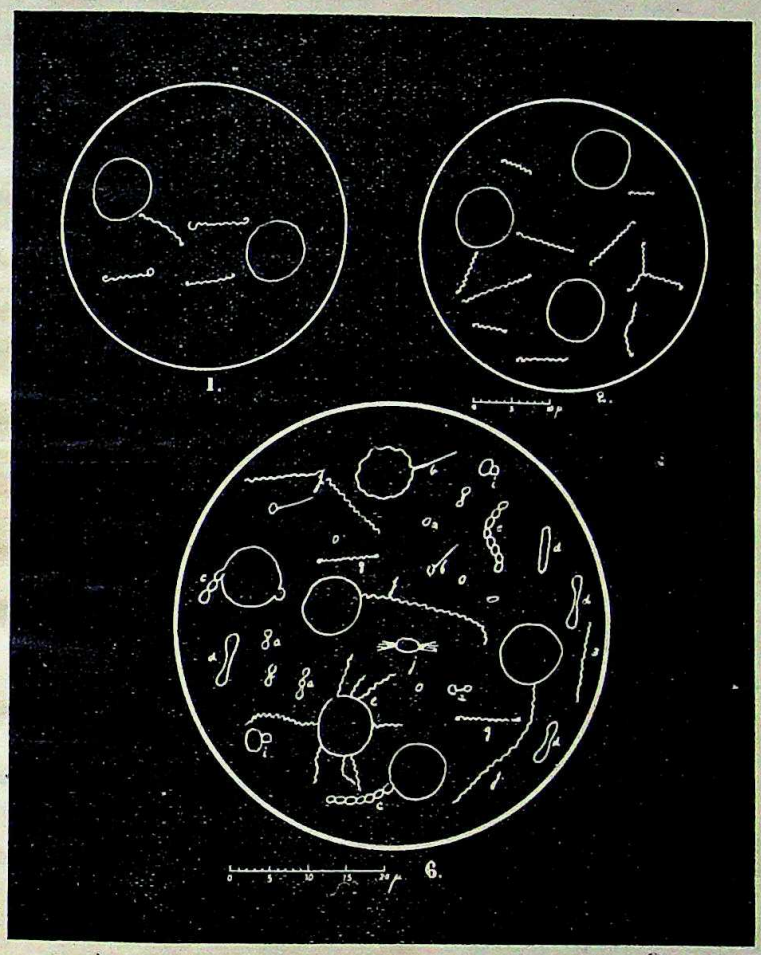

Fig. 1.—Leptospira-like form seen by Col. Megaw in the blood of a dengue case. Sketches of the same form seen at different intervals of time.

Fig. 2.—The leptospira-like artifact described in the text; as seen on dark ground examination of dengue bloods, cultures and the blood of inoculated animals.

Fig. 6.—The puzzles and fallacies of dark ground examination of blood.

(*a*) The hæmoconia particle. (*b*) The straight non-motile streamer. (*c*) The chain streamer. (*d*) The pessary body. (*e*) The multiple short streamers. (*f*) The long, motile, filamentous streamer. (*g*) The leptospira-like artifact. (*i*) Yeasts. (*j*) A short motile bacillus.

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to be actively motile with movements of forward and backward progression, often diving down into the fluid and then coming up again as is so characteristic of spirochæte movement. The length varied from 4 to 20 μ, but was usually about 8 to 9 μ. Of 56 specimens roughly measured with the ocular micrometer whilst still motile the average length was 7.8 μ. As a rule

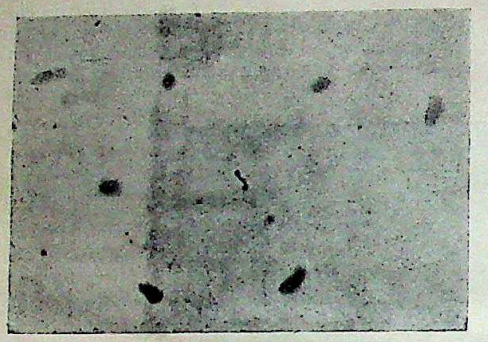

Fig. 3.—Microphotograph of the leptospira artifact from a culture. Short form. Schaudinn's fixative; iron hæmatoxylin stain.

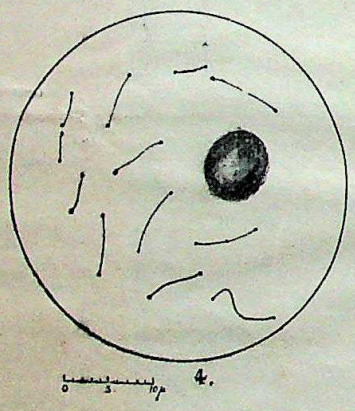

Fig. 4.—Camera lucida drawings of the same from a culture. Same fixative and stain.

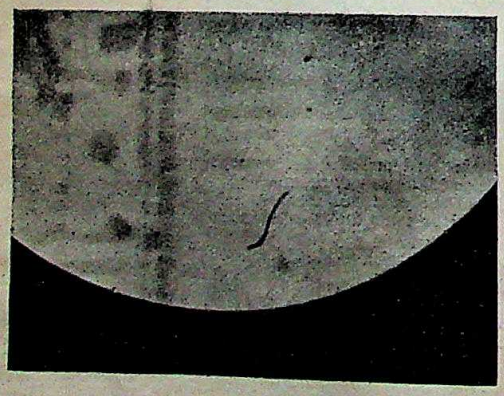

Fig. 5.—Microphotograph of the same artifact, long form, as produced in heated non-dengue blood. Same fixative and stain.

these forms were brightly refringent when compared with the pseudo-spirochætes or erythrocyte streamers, but the appearance with regard to this point varied considerably with the lighting. They were fairly flexible, but less flexible than *T. pallidum* or *T. pertenue*. About 10 to 12 very regular and symmetrical turns would be present in a form 8 to 9 μ in length.

The most characteristic feature of these forms, however, was the *invariable* presence, either at one, but almost always at both ends, of what appeared to be a bead or spore. These beads were spherical, larger in diameter than the body of the ? organism, and much more refractile. They appeared as if loosely adherent to the ends of the spirochæte. Figure 2 illustrates the appearances presented by this leptospira-like form when studied under dark ground illumination.

These forms were found in dengue bloods (*a*) in perfectly freshly drawn blood within five minutes of shedding and in the first or second field examined; (*b*) in the complete absence of all such artifacts as erythrocyte streamers, pseudo-spirochætes, etc.; indeed on several occasions where these leptospira forms were found the films were searched for prolonged periods for such artifacts without their being encountered; (*c*) together with such artifacts in blood which had been under examination for some 15 to 20 minutes. Finally they were always present only in very scanty numbers, from 2 to 6 per dark ground preparation. Also the findings were consistent, if one drop of blood from a patient was positive, the same forms would be encountered in the next two or three preparations from the same patient.

With regard to the duration of fever in these cases the findings were as shewn in Table I.

TABLE I.

Direct Blood Examination of Dengue cases.

Duration of fever.	No. of cases examined.	No. positive.	No. negative.
Less than 12 hours ..	11	3	8
13 to 24 hours ..	6	3	3
2nd day	11	3	8
3rd day	3	1	2
7th day	1	0	1
Totals ..	32	10	22

With regard to these cases the positive case at the 3rd day was a patient whose temperature had just dropped to normal. The 7-day case was a patient who developed severe jaundice without fever on the 6th day. 200 c.c. of his urine was centrifuged in a sterile tube by centrifugalisation of repeated 20 c.c. samples in the same tube, and the deposit thoroughly searched under the dark ground. No spirochætes were found. In another case with two days fever the urine was also examined by the same technique but nothing found. In one patient, whose blood has just shewn positive findings and who had an enlarged spleen, spleen puncture was carried out, but no spirochætes were detected and no parasites upon culture. Liver puncture was also carried out in one patient at the 6th day of dengue, with cultures taken, but again with entirely negative results.

We next did our best to try and improve upon these findings. From positive cases, series of blood films were taken, stained by different methods and examined. In four positive cases blood was collected, allowed to clot in the 37°C. incubator and the serum examined at intervals up to 48 hours. No spirochætes were detected. In the case of a patient whose finger blood had just yielded positive findings, blood was taken from the vein into citrated saline and heavily centrifuged and the three layers examined. No spirochætes could be detected in the supernatant fluid or in the leucocyte layer, but they were present in fair numbers in the erythrocyte deposit. This was again repeated on two further positive cases; one shewed similar findings, the second shewed the organism present in all three layers.

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To facilitate further reference we may add that the positive findings occurred in serial cases Nos. 5, 8, 9, 11, 13, 14, 24, 25, 26 and 28.

Blood Cultures in Dengue Cases.—Blood cultures were taken simultaneously with the direct blood examinations. At first we used the medium suggested by Kaneko (1921) for *L. hebdomadis*, viz., one c.c. of rabbit blood added to 5 c.c. of Ringer's fluid at 45°C. on the water bath. From three positive cases and one negative case (Nos. 9, 11, 12 and 13) sixteen cultures were put up, incubated either ærobically or anærobically at 22° C. and at 37° C. and repeatedly examined up to 21 days. 14 of them remained sterile; none shewed any leptospira forms in culture.

We turned therefore to the modified Wenyon-Noguchi medium used by Whittingham (1922) for the leptospira found in his cases of sandfly fever, following his technique for pH standardisation and using at first rabbit blood, later human blood, in preparing the culture medium. We did not, however, obtain the rabbit's blood by the method advocated by Wenyon (1921). We have repeatedly tried in Calcutta to prepare media containing rabbit blood by venipuncture of the marginal vein of the rabbit's ear as advocated by Wenyon, and in every instance sepsis has resulted. In fact in the septic atmosphere of a laboratory in Calcutta during the monsoon season with numerous animals being brought into the laboratory daily for examination this method is quite unsuitable. Instead we bleed the rabbit by cardiac puncture, using in the 20 c.c. Roux syringe employed the minimum amount of citrated saline needed to prevent clotting, and then dropping the blood drop by drop from the syringe into the melted medium. We take it that the essential feature of Wenyon's modification is to get a tube with a network of fibrin, and this is obtained by the method which we adopted. Sepsis indeed is a special difficulty in all cultural work in Calcutta during the monsoon period, and we found it necessary to autoclave all media twice and to keep all tubes prior to inoculation in the 37° C. incubator.

TABLE II.

Primary Blood Cultures from Dengue cases.

Medium employed.	Inoculated from case.	Result of examining patient's blood.	Total No. of cultures.	Aerobic. 22° C.	Aerobic. Room temp.	Aerobic. 37° C.	Anaerobic. 22° C.	Anaerobic. Room temp.	Anaerobic. 37° C.
W. R. ..	14	+	6	1+	1+	1×	1-	1+	1-
W. R. ..	15	-	2	..	1+	..	..	1×	..
W. R. ..	16	-	4	..	2+	..	..	2×	..
W. R. ..	18	-	2	1-	1-	..	..	..	..
W. R. ..	23	-	6	1×	1+	1×	1×	1×	1×
W. R. ..	24	+	2	1+	..	..	1-	..	..
W. R. ..	25	+	2	1+	..	..	1+	..	..
W. R. ..	26	+	4	1+	1+	..	1+	1-	..
W. H. ..	27	-	3	1+	..	..	2-	..	..
W. H. ..	28	+	4	1+	1+	..	1+	1+	..
W. R. ..	28	+	4	1-	1+	..	1-	1-	..
W. H. ..	29	-	4	1+	1-	..	1-	1+	..
W. R. ..	29	-	4	1-	1-	..	1+	1-	..
W. H. ..	30	-	4	1+	1+	..	1-	1-	..
Glucose broth.	31	-	2	1-	..	1-	..	..	..
Summary 24 cultures+ out of			53	8+	9+	0+	4+	3+	0+
From cases with blood findings +			22	5+	4+	0+	3+	2+	0+
From cases with blood findings -			31	3+	5+	0+	1+	1+	0+

NOTE.—W. R.-Whittingham's modification of Wenyon-Noguchi medium made with rabbit's blood and standardised to pH 72

W. H.-The same, prepared however with human blood from non-dengue persons in place of rabbit blood.

+ indicates that leptospira-like forms were found, — that none were found and the culture remained sterile, × that the culture went septic.

The results of the primary cultures on this medium are shewn in Table II.

Twenty-four out of 53 tubes inoculated from 13 typical cases of dengue shewed forms exactly similar to those encountered on dark ground examination of dengue bloods. These commenced to appear in culture about the 5th day, seemed as a rule to be most numerous about the 8th or 9th day, and then seemed to disappear, although one tube remained positive for 28 days. At no time could any culture be termed "rich," the forms seen in these cultures appeared to be considerably more numerous than those seen on direct blood examination, about 5 to 20 per dark ground preparation, but multiplication seemed to be very slow indeed, and it appeared as if we were dealing with a true leptospira, but had not yet struck the best culture medium for it.

We next did our best to improve upon these results, transferring positive tubes from 22° C. or from room temperature to the 37° C. incubator; trying centrifugalisation methods in order to obtain concentration of the virus; using media prepared with ascitic fluid in place of blood and adding sterile rabbit and guinea-pig kidney, etc., but with no results. Sub-cultures on these media were tried, and also 4 batches, each of 6 tubes, of sub-cultures on Whittingham's medium from positive primary cultures. Cultures were also plated out on glucose agar and on blood agar plates. In none of these, however, did we find any leptospira forms.

Hitherto all attempts at obtaining stained preparations of the leptospira form seen had been fruitless. On centrifuging positive cultures and preparing films, however, we at last succeeded in obtaining stained preparations. The methods of fixation and staining used were: (*a*) wet fixation with Schaudinn's fixative, followed by Haidenheim's iron-hæmatoxylin method of staining, which is admittedly one of the best procedures for true cytological study. (*b*) Prolonged staining with very dilute Giemsa's stain after fixation with osmic acid vapour and methyl alcohol. (*c*) Fontana's stain after preliminary fixation with methyl alcohol. (*d*) Leishman's stain. Method (*c*) we discarded early as the resulting film is so full of deposit on fibrils of fibrin, etc., that one cannot be certain of what one is looking at.

Stained preparations by methods (*a*) and (*b*) having been obtained, however, were now carefully searched, and here a surprise awaited us. The forms seen in stained preparations were always exceedingly scanty, far more so than those seen under dark ground examination of the same material, some 3 to 4 per slide only. In all we have seen and studied some 40 of these forms as seen in preparations stained chiefly by method (*a*), whereas we have seen hundreds under dark ground illumination. But whereas under dark ground illumination the forms seen appeared to be *typical* leptospiræ, in the stained preparations they shewed little or *no resemblance to leptospiræ at all.* With iron-hæmatoxylin staining the density of staining varies very much, often the organism is completely decolourised, many stain faintly but with the terminal-beads staining deeply, a few stain deeply. Figure 3 is an untouched microphotograph of such a form from a positive primary culture from a dengue blood.

With Giemsa's stain the terminal beads stain deeply blue and the body of the organism deeply pink. With Leishman's stain the terminal beads stain deeply red and the body of the organism a pale violet. In a few instances the organism appeared to be almost straight and resembled a bacillus with metachromatic staining. In almost every specimen seen there is a sinuous curvature, the terminal beads are very prominent, and the stained forms very much recall the old English letter ſ, the body being thin and the terminal beads staining

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deeply. The appearance of minute elementary spirals running throughout the body, so characteristic of leptospira spirochætes and so well seen with this pseudo-organism in dark ground preparations, was *not* to be discovered in the stained preparations. Figure 4 of the plate illustrates the forms met with in stained preparations. We now began to wonder whether the organism with which we were dealing was indeed not a spirochæte at all, but a spirosoma or some similar form.

Animals inoculated with the blood of dengue cases.—Animal inoculation was resorted to throughout and every attempt made to transmit the virus to animals and to establish an animal strain for further experimental work. The findings for the 24 inoculated and 2 re-inoculated animals are shewn in Table III. The results are of considerable interest. (The controls will be dealt with later).

What we found in general was that after intravenous inoculation of dengue blood into an animal the first result was an immediate reactionary rise of temperature. Thus rabbit No. 12 shewed a rectal temperature of 103° F. just before inoculation, but an hour after the injection of 4 c.c. of dengue blood intravenously its rectal temperature was 105.4° F. Rabbit No. 13 shewed a temperature of 101° F. just before inoculation; it then received 4 c.c of citrated blood from dengue case No. 11 intravenously plus 4 c.c. of the same blood intra-peritoneally; an hour later its rectal temperature was 104° F. This is a well-known phenomenon and is probably due to the introduction of foreign proteids into the blood stream. The phenomenon is not constant, however, as it often fails to occur.

After this, the temperature drops usually a little, or —sometimes—considerably. Thereafter, however, the animals shewed for from 10 to 30 days an irregularly febrile temperature chart. Considerations of space here prevent our going into details, but the temperature chart of rabbit No. 15 which is shewn as Chart II is typical of the whole series in inoculated rabbits and monkeys (but not of the inoculated guinea-pigs). Despite their apparently febrile state, these animals shewed no other apparent symptoms.

TABLE III.

Animals inoculated with Dengue Bloods or Dengue Cultures.

Animal.	Dose given.	How given.	Donor.	Findings in donor's blood or culture.	No. of days during which animal was subsequently observed.	Blood findings in animal after inoculation.	REMARKS.
M 1	5 c.c.	I.V.	Case 1	–	31	5 times + on 22 examinations.	
M 2	4 c.c.	I.V.	Case 2	–	16	Once + on 12 examinations.	Culture from Case 16.
	3 c.c.	I.P.	Culture	+	10	Never + on 7 examinations.	
M 3	5 c.c.	I.V.	Case 3	–	31	Once + on 16 examinations.	
M 4	5 c.c.	I.V.	Monkey 1	+	41	Twice + on 18 examinations.	Passage.
M 5	5 c.c.	I.V.	Case 8	+	31	3 times + on 21 examinations.	
G P. 1	5 c.c.	I.P.	Case 1	–	14	Never + on 11 examinations.	
G P. 2	5 c.c.	I.P.	Case 2	-	13	Never + on 10 examinations.	
G P. 3	5 c.c.	I.P.	Case 16	–	11	Never + on 7 examinations.	
R 1	2 c.c.	I.V.	Case 2	–	11	Once + on 8 examinations.	
R 2	2 c.c.	I.V.	Case 3	–	11	3 times + on 9 examinations.	Passage.
R 3	5 c.c.	I.P.	Case 4	–	30	10 times + on 22 examinations.	
R 4	5 c.c.	I.P.	Case 5	+	6	Twice + on 5 examinations.	Died, 7th day.
R 5	5 c.c.	I.P.	Rabbit 1	+	18	Once + on 14 examinations.	Passage.
	5 c.c.	I.P.	Case 23	–	10	Once + on 8 examinations.	
R E	3 c.c.	I.P.	Culture	+	10	Never + on 7 examinations.	*Vide* Table VI.
R 7	5 c.c.	I.P.					
	2½ c.c.	I.V.	Case 7	–	2	Twice + on 2 examinations.	Passage. Killed 2nd day.
R 8	5 c.c.	I.P.					
	2½ c.c.	I.V.	Rabbit 7	+	25	4 times + on 18 examinations.	
R 9	5 c.c.	I.P.					
	2½ c.c.	I.V.	Rabbit 2	+	29	3 times + on 13 examinations.	
R 10	5 c.c.	I.V.	Case 9	+	12	Once + on 8 examinations.	Died 12th day.
R 11	5 c.c.	I.V.	Case 10	–	18	4 times + on 14 examinations.	Died 19th day.
R 12	4 c.c.	I.V.	Case 11	+	11	5 times + on 7 examinations.	Died 11th day.
R 13	4 c.c.	I.V.					
	4 c.c.	I.P.	Case 11	+	18	5 times + on 13 examinations.	
R 14	5 c.c.	I.V.	Case 12	–	23	5 times + on 16 examinations.	
R 15	5 c.c.	I.V.	Case 13	+	23	7 times + on 17 examinations.	
R 16	4½ c.c.	I.V.	Case 15	–	23	9 times + on 15 examinations	
24 animals.					18 (average	75 times + on 320 examinations	

Notes.—M., monkey. G. P., guinea-pig, R. rabbit. I. P., intra-peritoneally. I. V., intravenously. The bloods used were all citrated.

Turning to the findings in these experimental animals:—

(*a*) Three guinea-pigs inoculated intra-peritoneally with the blood of dengue cases Nos. 1, 2 and 16 never shewed any leptospira forms on blood examination. Their temperatures ranged from 102° to 104°F, with a mean on 30 observations at 102.8°F. The normal rectal temperature of the guinea-pig is stated by Archibald (1921) to range between 38.5 to 39.4°C. (101.3 to 102.9°F.) with a mean at 38.7°C. (101.7°F.); and these animals can scarcely be regarded as having been more than slightly febrile. On 28 examinations of their blood no leptospira forms were ever seen, and it would appear as if the guinea-pig was relatively insusceptible to experimental infection with dengue, although relatively susceptible to infection with other

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leptospira infections,—a point also noted by Chandler and Rice.

(*b*) Of four adult *M. rhesus* monkeys inoculated intravenously with the blood of dengue cases all subsequently shewed fever or apparent fever. The temperatures ranged from 100.2 to 106°F., with a mean on 76 observations of 102.9°F. Archibald (*loc. cit.*) quotes a range of from 94.8 to 104°F. with a mean at 101.1°F. for the rhesus monkey; and in general these four monkeys appeared to run an irregularly febrile chart for the 10 to 31 days that they were under observation. Chart I is typical of the findings in these monkeys. All of them shewed the same typical leptospira-like forms on blood examination,—10 positive findings on 69 examinations.

In addition to this monkey No. 2, inoculated intraperitoneally with a dengue culture shewing leptospira forms, ran for 10 days a temperature oscillating from 101.6 to 104°F., with a mean at 103.2°F., but shewed no leptospira forms on 7 examinations. Monkey No. 4 was a passage monkey from the venous blood of monkey No. 1 at a moment when the latter's blood shewed leptospira forms. For 41 days it ran an irregularly febrile chart, ranging from 102.6 to 104.6°F., with a mean at 103.5°F.; it also shewed leptospira forms on 2 out of 18 examinations.

(*c*) Thirteen rabbits were inoculated either intravenously or intra-peritoneally or by both routes simultaneously with the blood of dengue cases. All of them subsequently shewed apparently irregularly febrile temperature charts for periods up to a month, and all of them shewed the same leptospira-like forms in their blood. The normal temperature of a rabbit is given by Archibald (*loc. cit.*) as from 37.3 to 39.9°C (99.1 to 103.8°F.), with a mean at 39.2°C. (102.6°F.). Chart II is a typical example of the findings in these rabbits. These 13 rabbits were observed over periods ranging from 2 to 30 days and shewed temperatures ranging from 102.4 to 107°F., with a mean on 139 observations at 103.9°F. Leptospira forms were encountered on 45 out of 144 examinations.

In addition to this rabbit No. 5,—an intravenous passage from rabbit No. 1 at a moment when the latter's blood was positive,—shewed temperatures ranging from 102.4 to 104°F., during the next 18 days, with a mean at 103.4°F., on 14 observations; leptospira forms were only seen once in 14 observations,—on the 7th day after inoculation. Rabbit No. 8, a passage from rabbit No. 7 when the latter's blood was positive, shewed a chart ranging from 102.6 to 104.6°F., with a mean at 103.6°F. on 17 observations during the next 25 days, and leptospira forms on 4 out of 18 examinations. Rabbit No. 9, a passage from rabbit No. 2 at a moment when the latter's blood was positive, shewed temperatures ranging from 102.8 to 107°F., with a mean at 104.2°F., on 13 observations. This rabbit for some reason shewed rectal temperatures of 107°F. and 106°F. on the 27th and 29th days after inoculation, with typical leptospira forms present on both days. Rabbit E, inoculated with a positive 28 days culture, shewed temperatures varying from 103.4 to 106.6°F. during the next 10 days with a mean at 105.2°F., on 7 observations, but no leptospira forms on 7 examinations.

The reader may ask why we did not concentrate our attention only upon such dengue cases as shewed positive findings on blood examination, and inoculate animals only with such selected material. The reasons why we did not do so were two-fold. First we were anxious to work with consecutive, unselected material; as long as the patient shewed typical symptoms of dengue he was used. In the second place the pressure of work with only two investigators and one laboratory assistant was such that whilst one worker was examining the peripheral blood the other did venipuncture and carried out the inoculation of animals and cultures, and we frequently did not know whether the blood was positive or negative until after the inoculations had been carried out. As a matter of fact all the monkeys and rabbits inoculated from dengue cases, whether such cases did or did not shew the leptospira forms in their blood, subsequently shewed what was apparently fever of an irregular type, and all yielded positive leptospira findings. It also appeared as if those inoculated from dengue cases whose blood was positive gave a heavier incidence of positive findings, 32 per cent., than did those inoculated with negative bloods, 29 per cent., as will be seen from Table III.

Four animals in the series died, viz., rabbits Nos. 4, 10, 11 and 13. These were most carefully examined post-mortem and their heart blood and emulsions of the viscera searched for leptospira forms. None were encountered. The cause of death could not be established in any of these four animals, but a mortality of 4 out of 24 animals kept under experimental conditions for periods of from 10 to 40 days probably does not exceed the normal.

Every attempt was next made to secure permanent stained preparations from the blood of the positive animals, using thin and thick films, trying centrifuge methods, etc., but—as with the human bloods—we again failed to get stained films of the leptospira forms encountered. Rabbits Nos. 2 and 7 were killed at times when their blood shewed leptospira forms present and their cardiac blood immediately passaged into fresh rabbits. A thorough search of emulsions of all viscera,—liver, lungs, spleen and kidneys—and of the urine present in the bladder failed to shew any leptospira forms.

Cultures from positive animals.—From such inoculated animals as proved positive we next attempted to recover the organism in culture. The results are shewn in Table IV.

TABLE IV.

Cultures from the blood of Animals Positive in Table III.

Medium used.	Inoculated from animals.	Total No. of cultures.	AEROBIC.			ANAEROBIC.		
			22°C.	Room Temp.	37°C.	22°C.	Room Temp.	37°C.
K. ..	M. 1	4	2—		2—			
K. ...	R. 1	4	1—		1—	1—		1—
K. ..	R. 2	4	1—		1—	1—		1—
W. R. ..	R. 9	5	1+	1+	1+	1+	1+	
W. R. ...	R. 12	3		2+1—				
Glucose broth.	R. 13	1			1—			
W. R. ...	R. 14	2	1×		1×			
Glucose broth.	R. 12	1			1+			
W. R. ...	R. 15	2	1—	1+				
Summary (W. R.)		12	1+	4+	1+	1+	1+	0+

Notes.—K., Kaneko's medium. W. R., Whittingham's modification of Wenyon-Noguchi medium made with rabbit's blood. M., Monkey, R., rabbit.

+ Culture shewed leptospira forms, — culture remained sterile but shewed no leptospira forms, × culture became septic.

As with the human dengue cases, here again we failed with Kaneko's medium, but succeeded with Whittingham's modification of Wenyon-Noguchi medium,—8 out of 12 cultures positive. Sub-cultures were next put up, and at last, in one solitary instance, a sub-culture from a positive culture from rabbit No. 9, leptospira forms were found on the 6th day. The other sub-cultures were negative.

In general, with regard to the animals inoculated with the blood of dengue cases, with positive cultures shewing

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leptospira forms, or as passages from inoculated and positive animals, we may conclude:—

(1) That guinea-pigs appeared to be absolutely resistant. They shewed neither definite fever nor leptospira findings.

(2) That rhesus monkeys and rabbits, after a preliminary and transient rise of temperature due to the injection of foreign proteid, tended to shew for from the 10 to 40 days during which they were kept under observation an erratic and generally febrile temperature chart with from time to time leptospira-like forms present in the blood in very scanty numbers.

(3) Cultures from the blood of such animals again yielded the same leptospira-like forms from the 6th to the 20th day, and one successful sub-culture had been obtained.

We next investigated the question of any possible correlation between the leptospira findings and the degree of fever present. The findings are shewn in Table V.

of 55 examinations were positive; at 106 to 107°F. 58 per cent. of 19 examinations were positive. The numbers dealt with are too small for any detailed analysis, but there does appear to be a definite correlation.

Preliminary Survey.—Before passing to the extremely important subject of controls, we may here attempt a preliminary analysis of the results to date. It will be seen that, although not proved, the trend of the experimental evidence was so far more and more in favour of a leptospira-like micro-organism being the true causative parasite of dengue. Such a leptospira form had been seen in the blood of 10 out of 32 typical cases of dengue and seemed to shew a special association with the early and acute febrile phase. It had been obtained in 24 out of 53 cultures from dengue bloods and from 5 out of 13 dengue cases (Table II). Of animals inoculated with the blood of dengue cases all 3 guinea-pigs had failed to take, but all 4 monkeys and all 13 rabbits had shewn an erratic but febrile temperature chart with from time to time scanty leptospira-like forms in their blood (e.g., Charts I and II). Moreover the positive findings appeared to shew a definite correlation to the degree of fever present. From

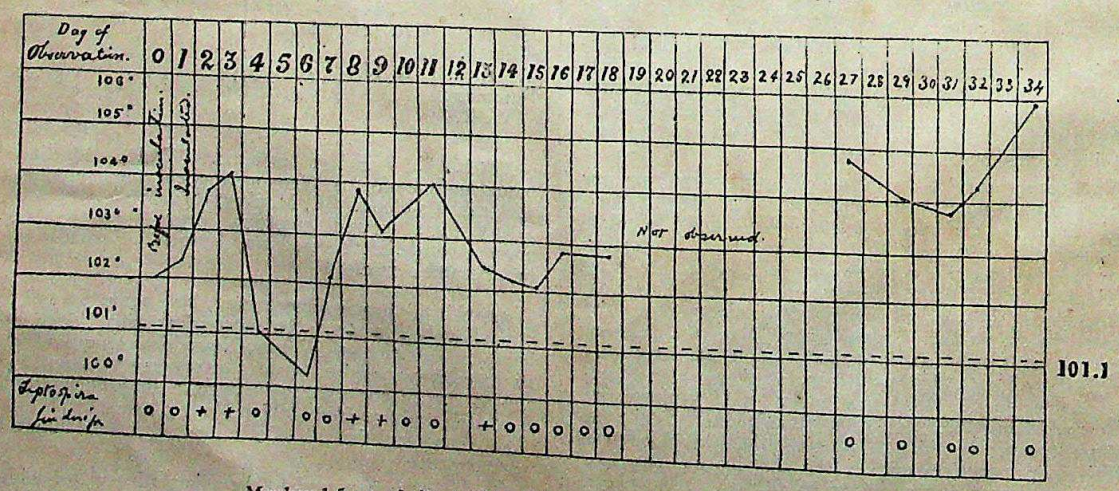
TABLE V.

Inoculated Animals. Correlation between Leptospira Findings and Temperature.

Temperature.	Monkeys.			Rabbits.			Combined.		
	+	−	Total.	+	−	Total.	+	−	Total.
100 to 101°F.	0	4	4	0	1	1	0	5	5
101 to 102°F.	3	5	8	0	0	0	3	5	8
102 to 103°F.	5	38	43	0	12	12	5=9 %	50	55
103 to 104°F.	5	26	31	11	45	56	16=18%	71	87
104 to 105°F.	1	5	6	31	43	74	32=40%	48	80
105 to 106°F.	0	0	0	14	14	28	14=50%	14	28
106 to 107°F.	0	1	1	11	7	18	11=58%	8	19
Totals ..	14	79	93	67	122	189	81	201	282
Percentage positive ..	16%	....	....	35%	....	....	29%	....	....

It will be seen that there is here a distinct correlation between the degree of fever present and the percentage of positive findings. At 102 to 103°F., only 5 per cent.

CHART I.



Monkey 1.5 c.c. of citrated blood from dengue Case I. Intravenously.

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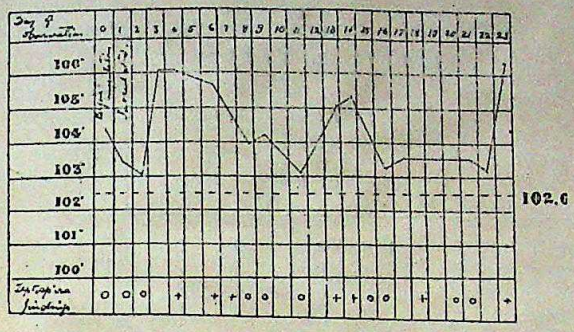
such positive animals the same leptospira-like form had been obtained, in primary blood culture, and once in sub-culture. With the aid of a little *suppressio veri et*

CHART II.



Rabbit 15. 5 c.c. of citrated blood from dengue Case 13. Intravenously.

suggestio falsi, the whole of this memoir could be easily re-written as evidence very strongly in favour of the leptospira theory of dengue.

CONTROLS.

There were certain facts, however, which gave us furiously to think. In the first place the "organism" when stained looked nothing like a spirochæte (figure 4); yet that these stained forms *were* the same as the leptospira-like forms seen under dark ground illumination is proved by the almost invariable presence at their ends of the same bead or spore-like process. Secondly, the erratic character of the temperature charts and the irregular alternation of positive and negative findings in the inoculated animals were puzzling. Thirdly, the variability of the findings in the "positive" cultures, in all of which the leptospira forms seen were scanty, and in some present on 2 or 3 out of 5 examinations, but not discoverable on the other days. From the very beginning our observations were fully controlled, but by degrees the controls became more and more important, until, towards the conclusion of the enquiry, they came to dominate the experimental picture. The control experiments may be grouped as follows:—

(1) *Examination of non-dengue bloods.*—Fresh blood preparations from 10 healthy persons who had not had dengue during 1923 were thoroughly examined for from 15 to 20 minutes each, the technique used being the same as for the dengue bloods. In addition the blood of the senior writer, who had had an attack of what *may* have been dengue in 1922, but who went through the 1923 epidemic without shewing a single symptom of dengue, was repeatedly examined. The serum of 4 non-dengue persons was also examined. In none of these preparations was anything resembling a leptospira form encountered, although pseudo-spirochætes (erythrocyte streamers) were frequently seen.

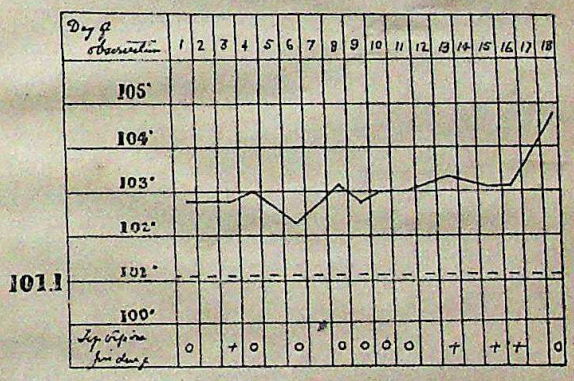
(2) *Cultures from non-dengue bloods.*—Twelve cultures (one each at 22°C., room temperature and 37°C.), in Whittingham medium prepared with rabbit blood were inoculated with the blood of 4 non-dengue persons. Glucose broth cultures from 2 non-dengue persons were taken and incubated at 37°C. A culture from the serum of a non-dengue person was also taken in glucose broth and incubated at 37°C., and 3 sets of cultures from non-dengue sera by a method advocated by Dr. Helen Chambers (1913) in a paper to which further reference will shortly be made. In none of these, although repeatedly examined, was anything like a leptospira encountered.

A culture from the senior writer's blood on Whittingham medium made with rabbit blood and kept at room temperature was found, however, to be positive on the 15th day of culture, and shewed *exactly the same leptospira-like forms* in very scanty numbers on dark ground examination. This was admittedly a most puzzling finding.

(3) *Control non-inoculated animals.*—Eight healthy and non-inoculated guinea-pigs were taken from the run and were examined. Their rectal temperatures varied from 103.2 to 105°F., with a mean at 104.2°F., this being rather high, as two of them, for some inexplicable reason, shewed temperatures of 105°F. A 9th healthy guinea-pig was taken, caged and placed under daily observation. Over a period of 10 days its temperature varied from 100.6 to 104°F., with a mean at 102.5°F. The blood of all 9 guinea-pigs was examined, and that of the 9th again examined on 8 consecutive days. In none of the 16 examinations was anything like a leptospira encountered.

Seven healthy and non-inoculated rhesus monkeys were taken and examined. Their rectal temperatures varied from 101 to 103.6°F., with a mean at 102.7°F. But here a surprise awaited us. On examining their bloods, no less than 3 of them shewed again *exactly the same leptospira forms* as previously encountered in the human dengue cases, with its characteristic beaded ends. Two other fresh monkeys were taken and placed under daily observation. Of these monkey A, observed for 18 days, shewed temperatures ranging from 102.4 to 104.8°F., with a mean at 103.1°F., and with typical leptospira forms present on 4 out of 12 examinations. (Chart III). Monkey B, observed for 7 days, shewed

CHART III.



Monkey A. Non-inoculated control.

temperatures ranging from 102 to 103.2°F., with a mean at 102.5°F., but no leptospira forms seen on 4 examinations.

Thirteen healthy and non-inoculated rabbits were taken and examined. Their temperatures varied from 103 to 105°F., with a mean at 104.2°F., and the blood of one of them shewed again *exactly the same leptospira forms as before.* Two non-inoculated rabbits were placed under daily observation. Of these rabbit C, under observation for 16 days, shewed a range of temperature of from 102.5 to 105.6°F., with a mean at 103.8°F., and leptospira forms present on 5 out of 12 examinations (Chart IV). Rabbit D, under observation for 18 days, shewed temperatures varying from 103.2 to 104.8°F. with a mean at 103.9°F., and leptospira forms present on 3 out of 13 examinations. As a further control rabbit E may be included. This was inoculated intravenously with the blood of what was thought at the moment to be a dengue case, but on examining the patient's blood no leptospira forms were seen and microfilariæ were present, and the case was almost certainly one of filarial fever and not of dengue. Rabbit E, kept under observation for 16 days, shewed temperatures ranging from 103.2 to 105.4°F. with a mean at 103.8°F., but neither leptospira nor microfilariæ found on 11 consecutive examinations.

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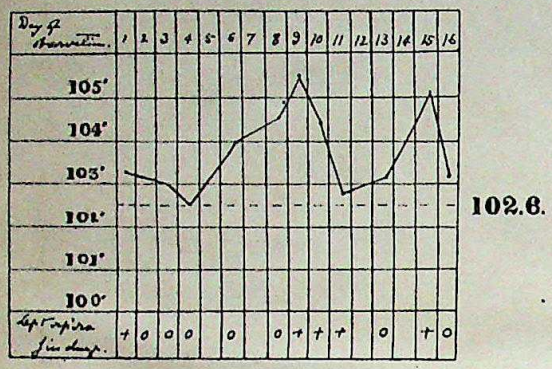
Monkey B and rabbit E, clearly not infected with dengue and with consistently negative blood findings, were next taken and used as critical animals upon which to test positive dengue cultures. The details of these two experiments were as follows:—

CHART IV.



Rabbit C. Non-inoculated control.

(*a*) Serial dengue case No. 16, laboratory sweeper at the School, reported sick with typical symptoms of dengue on the 18th of August. No leptospira found in his blood on examination. A guinea-pig was inoculated intra-peritoneally with his blood with subsequently negative results. Cultures were taken on Wittingham media made with rabbit blood and placed at room temperature, —2 ærobic and 2 anærobic. The latter went septic, the former were both positive on the 9th day. 3 c.c. of one of these cultures was given intravenously to monkey B and a further 3 c.c. intravenously to rabbit E. The results were as follows:—

Monkey B.—Before inoculation 4 examinations negative. After inoculation 5 out of 8 examinations positive.

Rabbit E.—Before inoculation 11 examinations negative. After inoculation 7 examinations negative. This rabbit, however, appeared to shew definite fever for 11 days after inoculation.

The findings in the control animals are summarised in Table VI.

Table VII shews that with regard to the 15 positive and 56 negative findings in the control non-inoculated animals there again appears to be a correlation between the percentage of positive findings and the degree of fever present.

TABLE VII.

Non-Inoculated Control Animals, Leptospira findings and Temperature.

Temperature.	Monkeys.			Rabbits.			Combined.		
	+	−	Total.	+	−	Total.	+	−	Total.
101 to 102°F. ..	1	3	4	0	0	0	1	3	4
102 to 103°F. ..	2	8	10	1	6	7	3	14	17
103 to 104°F. ..	3	3	6	4	14	18	7	17	24
104 to 105°F. ..	0	2	2	2	19	21	2	21	23
105 to 106°F. ..	0	0	0	2	1	3	2	1	3
Totals ..	6	16	22	9	40	49	15	56	71

The figures are too few in number for any definite conclusion on this point, but the temperature chart of rabbit C shews the way in which positive findings seem to go with a high temperature.

(4) *Cultures from non-inoculated control animals.*—The finding of the same leptospira-like form in healthy and non-inoculated animals is in itself surprising enough. We took rabbit C (non-inoculated control), on a day when its blood shewed these forms present and inoculated 4 tubes of Whittingham medium made with rabbit blood, —2 ærobic and 2 anærobic, one each at 22° C. and at room temperature. Both the tubes at 22° C. shewed again typical leptospira forms from the 4th to the 9th days of culture, but both tubes at room temperature remained sterile and negative. Subcultures were attempted from a positive tube but with negative results.

(5) *Summary with regard to Controls.*—The position was now exceedingly puzzling. The blood of 10 non-dengue persons had failed to shew any leptospira-like forms, and 12 cultures from 4 of these persons had remained negative. On the other hand a culture from a person whose blood had been persistently negative and

TABLE VI.

Findings in Control, Non-Inoculated Animals.

Animals observed.	Under observation for	Blood findings.	Extreme range of temperature.	Mean temperature.
8 guinea-pigs ..	Once only ..	None + on 8 examinations ..	103·2 to 105°F. ..	104·2°F.
One guinea-pig ..	8 days ..	Never + on 8 examinations ..	100·6 to 104°F. ..	102·5°F.
7 monkeys ..	Once only ..	3 times + on 7 examinations	101 F. to 103·6°F. ..	102·7°F.
Monkey A ..	18 days ..	4 times + on 12 examinations	102·4 to 104·8°F. ..	103·1°F.
Monkey B ..	7 days ..	Never + on 4 examinations	102 to 103·2°F. ..	102·5°F.
13 rabbits ..	Once only ..	1 + on 13 examinations ..	103 to 105°F. ..	104·2°F
Rabbit C ..	16 days ..	5 times + on 12 examinations	102·5 to 105·6°F. ..	103·8°F.
Rabbit D ..	18 days ..	3 times + on 13 examinations	103·2 to 104·8°F. ..	103·9°F.
*Rabbit E ..	16 days ..	Never + on 11 examinations	103·2 to 105·4°F. ..	103·9°F.
34 animals ..	....	16 times + on 88 examinations	....	....

Note.—* Rabbit E inoculated with the blood of a case of filarial fever, inoculated febrile blood control. *Vide* also Table III.

The temperature chart of rabbit C is given in Chart IV as being typical of the whole series of non-inoculated animals. (This rabbit died, for some reason, on the 17th day of observation, but again a most thorough post mortem examination failed to shew the cause of death and no leptospira forms could be found in emulsions of the viscera.)

who had entirely escaped dengue in 1923 yielded the characteristic leptospira-like forms on the 15th day of culture. Of 7 non-inoculated monkeys 3 shewed the same form and a non-inoculated monkey, placed under daily observation for 18 days, shewed the same sort of temperature chart as did the inoculated monkeys and leptospira forms present on 4 out of 12 examinations. Of

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13 non-inoculated control rabbits one shewed leptospira forms, and 2 non-inoculated rabbits kept under observation for 16 and 18 days, respectively, both shewed erratic but febrile temperature charts and leptospira forms on 8 out of 25 examinations (rabbits C and D). The "organism" had been obtained in pure culture in Whittingham medium inoculated with the blood of a non-inoculated rabbit, and later the culture had appeared to die out. All attempts to obtain permanent stained preparations had again been negative, owing to the scantiness of the leptospira-like forms.

At this stage we passed through a set of experiments directed towards trying to concentrate the "organisms," taking positive human and animal bloods and positive cultures and laking the blood, and centrifuging and searching the deposit. These had negative results; in fact throughout the enquiry direct examination of the citrated blood or of the cultures under the dark ground yielded a greater percentage of positive findings than did any other method.

FINAL EXPERIMENTS.

We next commenced to examine the tubes of Whittingham medium *before* inoculating them, as a still further control, and were amazed on the 20th of September to discover *exactly the same leptospira-like forms as before* in a tube of culture medium taken straight from the incubator, prepared by the addition of rabbit blood on the 18th of September, but not inoculated with anything at all, "tube 28" of the series.

These findings admitted of only four possible explanations:—

(*a*) That the leptospira-like form was an artifact from the skin or fur of the animals under examination. The fact that it was found in blood obtained by venipuncture (in some instances) of human cases of dengue, that it was entirely absent from guinea-pig bloods, and from all the control non-dengue human and guinea-pig bloods appeared to negative this. Monkey A (non-inoculated control), shewed the typical forms present one morning on blood examination. It was immediately taken, its forearm shaved, cleansed with soap and water, and sterilised in turn with alcohol ether and tincture of iodine. The needle, slides, cover slips and forceps used were all flamed. Three drops of its blood were taken without the addition of any citrated saline and examined direct. In all three the same forms were present in scanty numbers. Whatever the nature of the "organism" seen, it undoubtedly came from the blood and not from extraneous sources.

(*b*) That we were dealing with a "wild" leptospira which occurs in the blood of monkeys and rabbits, but not in that of guinea-pigs. The findings in the human cases negative this. Surely "wild" leptospiræ do not inhabit the human blood in dengue, but not in health.

(*c*) That the control, as well as the experimental animals were themselves going down wholesale with dengue, as well as the human population around them. This appeared to be not impossible. The attendants on these animals, the sweepers, durwans and establishment at the School were going down wholesale with the disease. On the other hand why should guinea-pigs, which are usually held to be especially susceptible to leptospira infections, be so peculiarly immune? On this point we did our best to collect information, and a press communique was issued asking for information as to the possible incidence of dengue amongst the animal as well as amongst the human population. In one instance it was mentioned that a horse and two dogs belonging to a household where there were several cases of dengue had been ill at the same time as the human beings concerned, but in general there was no definite evidence that there was any general epidemic among the animals in Calcutta. The volume of horse and bullock traffic in Calcutta city did not appear to be diminished. Cats were as prevalent and as active as ever at nights, especially in the Park Street area where 6 were caught at the height of the epidemic in a specially devised cat-trap and made over to the Pharmacology Department of the School for experimental purposes; whilst Dr. Bradley, who is an enthusiastic volunteer in the same cause, caught no less than 8 in one night at the Grand Hotel (6 of which were unfortunately rescued by lady residents at the hotel before he could smuggle them down to the School). Further the "positive" monkeys and rabbits did not shew any joint swellings, no rashes were observed, and they did not appear to be suffering from joint pains to judge by the activity of their movements.

(*d*) That the leptospira-like form was an artifact of a peculiar and novel type, only present in the blood during febrile states. The whole trend of the evidence pointed in this direction; the presence of the form in febrile bloods and its absence from non-febrile bloods; its complete absence from guinea-pig bloods, where in our experience artifacts are rare; the erratic and alternating findings in "positive" animals and cultures, both inoculated and non-inoculated; the pseudo-correlation of the form with the degree of fever present; the finding in stained preparations of forms with beaded ends similar to the leptospira-like forms seen under the dark ground, but not true leptospiræ at all; finally the finding of the same form in a non-inoculated tube of culture medium prepared with rabbit blood.

A set of experiments was therefore devised to test the validity of this last hypothesis. It was clearly useless to inoculate any human volunteers or experimental animals with the primary cultures, since in these the original dengue virus might easily have survived merely and not have multiplied. Also it seemed of little use to inoculate even subcultures into men or animals in Calcutta city, since, if dengue resulted and leptospira forms were found in the blood, one would not know whether the infection had resulted from the inoculation or had been acquired through natural channels. Certain experiments were, however, feasible, and they were as follows:—

(1) Tubes of Whittingham medium were made with human blood from persons who were free from dengue in 1923, in place of preparation with rabbit blood. These are the tubes marked "W. H." in Table II, and they were inoculated with dengue bloods. Of 15 such tubes inoculated from 4 dengue cases 9 shewed the same leptospira-like form again. The organism could not therefore be a "wild" leptospira of monkeys and rabbits.

(2) Subcultures were taken from positive tubes into flasks of glucose broth and these were incubated, some ærobically and some anærobically, at 37° C., to test the possibility of the form being a bacillus of aberrant type. No growth resulted.

(3) The junior writer having gone down with a severe attack of dengue during the enquiry was of no value as an experimental animal. The senior writer, however, seemed a suitable animal. His blood had been repeatedly examined with negative results. He had entirely escaped the disease. "Tube 28" (non-inoculated tube prepared with rabbit blood) shewed what was undoubtedly the same organism, whatever its true character. This might be the leptospira of dengue accidentally present and derived from the blood of the rabbit used in preparing the medium, or it might be an artifact. Half a c.c. of the culture was taken hypodermically by the senior writer at a time when dark ground examination shewed it to be positive. Beyond a slight local reaction the next day, the result was completely negative, and not a single symptom of dengue manifested itself. Had the injection been followed by dengue the experiment would have been valueless under the local conditions present, but the completely *negative* result strengthens the case for regarding the form as an artifact.

(4) Three thick and four thin blood films were taken from cases of filarial fever and malaria, stained and searched for prolonged periods in the hope of finding the same forms in stained films from febrile bloods, but none could be found. Only from positive cultures could stained preparations be obtained and even then in extremely scanty numbers. Whatever the leptospira-like form is, it is exceedingly difficult to get stained preparations for study.

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(5) On the 11th September the blood of rabbit No. 12 (inoculated intravenously with the blood of dengue case 11, which had shewn leptospira forms on direct examination), shewed fairly numerous leptospira forms. A blood culture was taken from this rabbit into a flask of glucose broth and incubated ærobically at 37° C. On the 10th day the contents of this flask, after centrifuging, shewed the same form present in scanty numbers. A true leptospira, however, should not multiply or even survive under such conditions.

(6) A case of what was clinically typical sub-tertian malaria was obtained from out-patients on the 24th of September. Stained films unfortunately failed to shew parasites, but the case appeared to be typically malaria, and was not at all like dengue. Direct examination of the blood under the dark ground failed to shew leptospira forms. 10 c.c. of blood was taken from the patient, defibrinated, and placed on the water bath at 106° F., (41° C.). Drops were removed from time to time with a sterile capillary pipette and examined under dark ground illumination. At 2 hours erythrocyte streamers commenced to form, but no leptospira forms were seen. At 2½ and 3 hours the blood was full of streamers, both free and still attached to the red blood corpuscles, but numerous and typical leptospira-like forms were present *exactly similar to those previously encountered*, and easily distinguished from the red corpuscle streamers by their more refringent appearance and bright beaded ends.

(7) Five c.c. of blood were taken from a volunteer. The donor has never had dengue and lives in a fifth floor flat where mosquitoes are practically absent. His blood may be regarded as a guaranteed non-dengue blood. The blood was defibrinated and placed on the water bath at 107.6°F. (42°C.), and half hourly observations carried out as before. At 1½ and 2 hours there was marked crenation of the erythrocytes, but no artifacts were seen. At 2½ hours very scanty but typical leptospira forms were seen, but no erythrocyte streamers. The temperature was now raised to 111° F., (44° C.). An hour later the blood shewed a fair number of streamers, whilst the leptospira-like forms were considerably more numerous. Film preparations were taken and stained, some by wet fixation with Schaudinn's fixative and Haidenheim's iron hæmatoxylin stain, others by fixation over osmic acid vapour, methyl alcohol and Giemsa staining. These were studied and again the appearances seen were those of the old English letter ∫. Figure 5 is an untouched microphotograph from one of these iron hæmatoxylin preparations. With this stain the same characteristic was noticed; that some decolourise entirely, others stain but faintly but with the beads at the ends staining more deeply, whilst a very few stain deeply both as regards the beads and the body of the form.

We conclude that the leptospira-like form found so repeatedly and throughout the enquiry is an artifact of a peculiar type.

Our attention was now drawn by Major Acton to a paper by Dr. Helen Chambers in the *Lancet* of 1913. In this the author describes what she regarded at the time as being a spirochæte present in the blood of the majority of healthy persons. We presume that at this date, ten years later, she will agree with us in regarding that view as an erroneous one. What *are* described in that paper are the different varieties of pseudo-spirochætes met with on dark ground examination of healthy and diseased bloods, and if the paper be read from that point of view it will be seen that it is a most valuable contribution to the scanty literature upon this most difficult subject. The following extracts from Dr. Chamber's paper shew that she undoubtedly encountered the same leptospira-like form in the blood of healthy persons and in cases of goitre in 1913 that we encountered in the dengue epidemic in Calcutta in 1923:—

"The organism is actively motile and is very variable in both length and thickness.....Some are extremely thin, others are almost as thick as typhoid bacilli..... The body is more rigid in the thicker forms.....it is often attached by one end, sometimes by both ends and the body then shows continuous lateral movements. In the thicker forms it shews a fine spiral structure appearing as dark and light closely set transverse lines —waves of motion passing from end to end of the spirochæte can often be detected.....the ends are usually rounded, sometimes they are swollen and look like spores.....round spore-like bodies are sometimes found loosely attached to the ends or laterally on to the spirochæte.

The spirochæte has been stained with Leishman's and Giemsa's stains. Small red chromatin particles are often found at the ends.....the thick forms are easier to stain than are the thin spirochætes, and in stained films the latter are often not detected. The best results with stained films have been obtained from a 48 hour broth culture.....In all the attempts at cultivation the organism has multiplied in the blood itself, or in the first culture taken. It has not, up to the present, been successfully sub-cultured."

MISCELLANEA.

We may here note upon a few miscellaneous experiments not already dealt with. Pemphigus occurred as a clinical complication in not a few of the cases and Dr. Muir very kindly brought us films taken from the contents of the bullæ in such a case in a child. These were stained by different methods and examined. Nothing resembling a spirochæte was seen, the only finding being scanty diplococci, many of them phagocytosed by the polymorphonuclear leucocytes.

Throughout the enquiry we used as a spirochætal control a stock laboratory strain of *S. morsus-muris*, very kindly supplied by Dr. M. J. Permanand, Tutor in Bacteriology, Grant Medical College, Bombay, and kept going by sub-passages in Japanese white mice. In the infected mice we have noted that the spleen is frequently enlarged, often considerably so, and fibrotic, and the best method of passage is to inoculate the mice with *both* the cardiac blood and ground up emulsion of the spleen of the infected mouse. Since 1918 we have come across this organism in five cases of rat bite fever seen in Shillong and Calcutta, whilst Major A. D. Stewart, I.M.S., also kindly presented us in 1922 with a wild rat from Kidderpore docks found infected in nature. On four different occasions we have succeeded in establishing laboratory strains, but in each instance the strain has unfortunately been lost through want of sufficient mice to keep it going. The guinea-pig is an unsuitable substitute; here the infection does take, especially if young guinea-pigs are used, but so scantily that the strain is soon lost in these animals. We have nothing to add to the excellent account of *S. morsus-muris* given by Permanand (1923), except to agree with him that, as is unusual with a spirochæte, the organism is far more easily found in stained films than by dark ground examination. Under the dark ground the longer forms shew a very striking resemblance to the pseudo-organism described in the present paper. We have made repeated efforts to culture *S. morsus-muris* in different media, but so far with negative results.

Transmission.—The pressure of work was such that we were unable to make any organised enquiry into the transmission problem as it affects Calcutta. Members of the staff of the School, however, collected mosquitoes from houses where numerous cases of dengue were occurring and kindly made them over to us. Dr. C. A. Strickland, Professor of Entomology, and Dr. D. N. Roy, Assistant Professor of Entomology to the School, very kindly examined and dissected some of these and allowed us to examine the fresh preparations. One female *Culex* which had not fed recently shewed nothing in either the gut contents, or in the crushed ovaries and salivary glands. Of 9 female *Culex* which had fed recently in dengue houses (whether upon dengue cases or not one cannot say) the gut contents of 4 shewed again the typical leptospira-like form in scanty numbers, varying from 5 to 14μ in length. The crushed ovaries and salivary glands of

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3 of them were examined, but nothing found. Dr. Sundar Rao, Filariasis Research Scholar at the School, also fed a laboratory bred batch of *Aëdes ægypti* on a typical case of dengue on the 29th of September and very kindly permitted us to examine the results of his dissections 21 hours later. In the gut contents of one we found again the same leptospira-like form. We may here remark, however, that if dark ground examination of citrated blood is full of pitfalls and difficulties, that of blood in culture is even more beset with difficulties, whilst when it comes to examination of semi-digested blood from the midgut of a biting insect the task is the most difficult of all. The whole field is full of hæmoconia particles and of pseudo-spirochætes and artifacts.

The junior writer proceeded to Shillong at the end of the enquiry. There had been one reported case of the disease in Shillong: but the patient went down with dengue on the day of his arrival from Calcutta.

Six *Aëdes ægypti* and 20 *Culex quinquefasciatus*, laboratory bred and fed on the 4th October on a typical case of dengue during the first day of fever, were kindly supplied by Dr. Sundar Rao and were taken to Shillong. On the way all the Stegomyia died, and only 9 Culex reached Shillong alive. These were now fed on a volunteer from Tezpur, Assam, an area entirely free from dengue in 1923—the subject never having had dengue. The subject was now placed under careful observation for 14 days. On the 6th day he complained of some headache, and the temperature rose to 99.6° F. for a few hours only. The subject never shewed any symptom really indicative of dengue.

Whilst at Shillong the junior writer again succeeded in producing the same leptospira-like artifact in defibrinated and heated blood from two persons who came from non-dengue areas in Upper Assam, and who had never been exposed to infection with dengue.

SUMMARY.

1. On the examination of blood from cases of dengue; of cultures in Wenyon-Noguchi medium from such bloods; in the blood of rabbits and of rhesus monkeys (but not in that of guinea-pigs) inoculated with dengue bloods; and again in cultures from the blood of these animals, we have repeatedly come across a form which under dark ground examination appears to be a typical leptospira.

2. As seen under dark ground illumination this pseudo-organism is more or less actively motile, it shews up as a rather refringent spirochæte, from 4 to 20 μ in length but with an average length of 8 to 9 μ, and is especially characterised by shewing at one, or usually at both ends, a bright bead—or spore-like process. It is present in only scanty numbers whether in the blood or in culture.

3. In stained preparations we have only been able to identify the same form in preparations from "positive" cultures and never in films from the blood of infected persons or animals. In stained films the organism still shews the typical beads at the ends, but is wholly unlike a spirochæte. It is very much more difficult to find in stained preparations than by dark ground examination.

4. The inoculated animals in general shewed an erratic but febrile temperature chart, but no other symptom of dengue.

5. On examination of blood from control non-dengue persons and control non-inoculated guinea-pigs we completely failed to find the same organism, although it was found in the midgut of fed *Culex* mosquitoes captured in dengue houses, and once in the midgut of an *Aëdes* (*Stegomyia*) *ægypti* fed 21 hours previously on a dengue case.

6. In the blood of control non-inoculated monkeys and rabbits, however, we found exactly the same organism. From these animals it was again obtained in culture and in stained preparations from cultures. Either the organism is an artifact, therefore, or else these non-inoculated animals were suffering from dengue acquired through natural channels. They shewed no symptom of dengue other than an irregularly febrile temperature chart.

7. The inoculation of a positive culture into one (presumably susceptible) human volunteer was not followed by any symptom of dengue.

8. We have artificially reproduced exactly the same leptospira-like form in non-dengue bloods, defibrinated and heated for from 2 to 3 hours on the water bath at from 106 to 111° F. (41 to 44° C.). Both under the dark ground and in stained preparations the forms here found correspond exactly with those encountered in the dengue cases, animals, cultures and controls.

9. We conclude that the leptospira-like form encountered so repeatedly is not a true spirochæte at all, but is an artifact, probably especially likely to be encountered when examining febrile bloods and previously described by Dr. Helen Chambers in 1913.

It is humiliating to confess, after two and a half months of strenuous work, that we believe that from first to last we were dealing with an artifact. Yet Major Acton kindly permits us to add that for some weeks he was inclined to believe that we had really discovered a true leptospira in dengue, and an artifact which can *almost* deceive so experienced a worker deserves description, if only as a warning to other workers. Although not the genuine article, it is at least a good *proxime accessit !*

Is dengue then a spirochætal disease? We do not know, but the work of Koizumi, Yamaguchi and Tonomura (1917), that of Chandler and Rice (1923), and the present memoir together constitute fairly strong evidence to the contrary. If the micro-organism of dengue be indeed a spirochæte, one would expect it to be possibly one of *S. morsus-muris* type, possibly vanishing rapidly from the blood at an early stage of the fever to settle in the connective tissues and peri-articular structures, where it may possibly remain for some weeks. In such a connection the findings of Couvy (1921, 1922) are very suggestive, but it will be seen that our findings are completely at variance with his.

We believe that the pseudo-spirochæte described in this paper may be not infrequently encountered in examining febrile bloods of both man and animals. In dengue the red blood corpuscles are probably more fragile than normal. In our monkeys, conditions of housing and feeding were not too good, whilst the rabbits in general, for

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some inexplicable reason, appeared to be febrile. Under such conditions it is likely that abnormal processes of erythrocyte degeneration should lead to the appearance of pseudo-spirochætes of an unusual pattern. As J. G. Thomson (1923) points out, the supposed "leptospira" of blackwater fever is probably another instance of an artifact being mistaken for a spirochæte.

In conclusion we have to thank Major H. W. Acton, I.M.S., for constant advice, direction, and most helpful criticism. Step by step he studied our findings and the forms met with, and suggested the lines of enquiry to be pursued. Also our thanks are due to Lieut.-Colonel J. W. D. Megaw, I.M.S., for constant help and advice, to Dr. Shivapada Bhattacharjee, M.D. (Calcutta), for taking no end of trouble in securing suitable cases for investigation, and to Mr. Nag, photographer to the School, for the microphotographs.

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*Not studied in the original.

APPENDIX.

I. *On the Rectal Temperature of Experimental Animals in the Tropics.*

We have shewn that we regard the pseudo-organism described above as an artifact. The presence of an artifact cannot possibly cause an animal's temperature to become elevated; but, on the other hand, the injection of a foreign blood may cause a transitory reactionary fever. Hence we took all our temperature records, and from them deleted all readings taken within 24 hours of the inoculation of a foreign blood into the animals. The remaining observations are analysed in Table VIII.

TABLE VIII.

Temperatures of Animals.

Animals observed.	Extreme range of temperatures.	No. of observations.	Mean of observations.
	Monkeys.		
4 inoculated ..	100.2 to 106° F.	72	102.7° F.
No. 2 inoculated with culture.	101.6 to 104° F.	7	103.2° F.
No. 4, passage ..	102.6 to 104.6° F.	19	103.5° F.
7 controls ..	101 to 103.6° F.	7	102.7° F.
Control A. .	102.4 to 104.8° F.	12	103.1° F
Control B. ..	102 to 103.2° F.	4	102.5° F.
Ditto, after inoculation with culture.	102 to 104.2° F.	8	103° F.
Total: 15 monkeys	101 to 106° F.	129	102.9° F.
	Rabbits.		
13 inoculated ..	102.4 to 107° F.	126	103.7° F.
No. 5, passage ..	102.4 to 104° F.	14	103.4° F.
No. 8, passage ..	102.6 to 104.6° F.	17	103.6° F.
No. 9, passage ..	102.8 to 107° F.	13	104.2° F.
13 controls ..	103 to 105° F.	13	104.2° F.
Control C. ..	102.5 to 105.6° F.	11	103.8° F.
Control D. ..	103.2 to 104.8° F.	12	103.9° F.
E. inoculated with filarial blood.	103.2 to 105.4° F.	11	103.8° F.
Ditto, after inoculation with culture	103.4 to 106.6° F.	7	105.2° F.
Total: 32 rabbits..	102.4 to 107° F.	224	103.7° F.
	Guinea-Pigs.		
3 inoculated ..	102 to 104° F.	27	102.7° F.
8 controls ..	103.2 to 105° F.	8	104.2° F.
1 control ...	100.6 to 104° F.	7	102.5° F.
Total: 12 guinea-pigs.	100.6 to 105° F.	42	103° F.

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It will be seen that our readings are at a definitely higher level than those given by Archibald (*loc. cit.*). The figures run as follows :—

Rhesus monkeys. Extremes, 94·8 to 104°F. Mean 101·1°F. (Archibald).
Extremes, 101 to 106°F. Mean 102·9°F. (our observations).

Rabbits. Extremes, 99·1 to 103·8°F. Mean 102·6°F. (Archibald).
Extremes. 102·4 to 107°F. Mean 103·7°F. (our readings).

Guinea-pigs. Extremes, 101·3 to 102·9°F. Mean 101·7°F. (Archibald).
Extremes, 100·6 to 105°F. Mean 103°F. (our readings).

We have been puzzled throughout the enquiry how to account for this finding. We believe that the thermometers which we used were reliable. In each reading the thermometer was held in place for two minutes as timed by a stop watch. Four thermometers were used at different times but all gave similar readings. We have shewn that we do not believe that epidemic dengue among the animals explains these readings. It is just possible, however, that during August and September, the two months of the year of most intense damp heat in Calcutta, the temperature of such animals *might* be somewhat higher than at other seasons of the year or in colder climates. Their heat regulating mechanism is presumably not quite so well balanced as that of man. On no less than 18 occasions rabbits apparently in the best of health and vigour gave rectal readings of between 106 and 107° F. (Table VI). More information on the subject is badly wanted, and its importance to laboratory workers in the tropics is obvious. We hope to place groups of healthy animals under daily observations over prolonged periods as soon as the newly built animal house at the School is ready, and to analyse the results at a future date. In the meantime we publish Table VIII mainly to draw attention to the matter.

II. *On the Puzzles and Fallacies of Dark Ground Examination of the Blood.*

No one can spend weeks and months together, as we have recently done, on an intensive study of bloods by dark ground examination without gaining a fairly detailed knowledge of this subject. We have not had access to the *Folia Hæmatologica*, but there are two excellent accounts in English of the pseudo-spirochætes and other artifacts encountered in the connection, the best being the classical paper by Dr. Andrew Balfour on blood examination (Balfour 1911), and the other being the paper by Dr. Helen Chambers (1913) already referred to. As the subject is, however, of great importance to laboratory workers we may perhaps be permitted to discuss it here. Figure 6 on p. 13 illustrates the forms most frequently encountered; it is drawn from a collection of sketches and rough notes and drawings made during the course of this enquiry. We believe that such artifacts are much more common in febrile than in afebrile bloods. It is well known that the hæmoconia particles are most conspicuous shortly after a meal when the lipoid content of the blood is raised as a result of the processes of digestion. Also such artifacts tend to increase with the interval of time that elapses between the shedding and the examination of the blood. Further they appear to be much more common near the vaseline edge of the preparation, where osmotic forces are in play, than in the centre.

An excellent way to study such artifacts is to take blood, defibrinate it and then "cook" it for two to three hours on a water bath at a febrile temperature, 106 to 111°F., and withdraw half hourly samples with a sterile capillary pipette for examination under the dark ground. The unheated blood of guinea-pigs appears to be singularly free from such artifacts, whereas they seem to be more numerous in the blood of rabbits and of rhesus monkeys than in that of man. It is important to note that pseudo-spirochætes in very scanty numbers may be encountered within a minute or two of taking the blood and in perfectly fresh material.

We would classify the commoner forms encountered as follows :—

(1) *The ultra-particle.*—The higher the magnification of the ocular used, the more of these that are discovered. They are tiny, ultra-minute particles close upon the limits of visibility, and shew Brownian movement. They are *not* refringent, but dull. If certain of the filtrable viruses be due to organisms of the micro-micro-organism type described by Lieutenant-Colonel H. M. Gordon, R.A.M.C., as the virus of pandemic influenza, then we do not envy the research workers who attempt to observe them under the dark ground, because the ultra-particles will constitute a very great difficulty. In 1922 in conjunction with Major Acton, I.M.S., we spent weeks trying to discover the micro-organism of rabies in the brains of fixed virus rabbits, but were compelled to temporarily abandon the enquiry because the artifacts in an emulsion of brain tissue, whether examined in fresh or in stained preparations, are so numerous that they almost prohibit the discovery of any ultra-minute living organism.

(2) *The hæmoconia particles or blood-dust.* (Figure 6 a).—These are seen in all or almost all preparations. The particle is about half a in diameter, often oval rather than round, and these particles occur either singly, frequently in pairs when they shew a dumb-bell shape, more rarely in chains of three. They shew vigorous Brownian movement. They can always be identified with certainty by one feature; from time to time as they oscillate in the fluid they suddenly catch the light and become for an instant brilliantly refringent, the beam of light resembling the sudden beacon flash from a light-house when seen at sea. These particles may be of lipoid origin.

(3) *The straight, non-motile streamer.* (Figure 6 b).—This is a straight, non-motile, spike-like process originating from the red corpuscles and more frequently from the blood platelets. We have never seen this streamer detached and it could deceive no careful worker. We have recently, however, had submitted to us stained blood films "shewing curious minute flagellate organisms." These were platelets shewing streamers. The straight streamer is *not* refringent, and it is often seen in stained films.

(4) *The chain streamer.* (Figure 6 c.).—These are not infrequent and they are well figured by Balfour. The red corpuscle, during its degeneration, appears to be producing bud after bud, each with its own independent limiting membrane, until a long chain-like form results, swaying in the fluid. We have also seen these chains detached and lying free in the plasma. They are *not* refringent and may simulate yeasts. To what extent true yeasts (cryptococci) are present in the blood of animals from time to time we have not yet determined, but we are convinced that they are not infrequent and that they constitute a special difficulty to workers on *Leishmania* infections in experimental animals.

(5) *The pessary body.* (Figure 6 d).—This probably represents the remains of a distorted or fragmented erythrocyte. Typically it is narrow in the middle and clubbed, ovoid or enlarged at both ends. It shews a well defined limiting membrane and a dull body. The shape may vary from a big bacillus-like form to a dumb-bell type, but it has one diagnostic feature. From time to time as it oscillates in the fluid it suddenly catches the light and becomes for a moment brilliantly refringent, as does the hæmoconia particle. There is the same beacon-like flash about it.

(6) *The multiple streamers.* (Figure 6 e).—Very frequently a degenerating red corpuscle is seen to be giving off simultaneously from 6 to 10 small, fine streamers. Pores appear to form in the erythrocyte membrane and from them the cytoplasm of the cell protrudes in the form of thin, pseudo-motile streamers, usually short and never, we believe, when multiple much

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longer than the diameter of the red cell. These forms are *not* refringent and we have never encountered them free in the plasma. We believe that what next happens is that usually one of them grows into the long motile streamer (No. 7) at the expense of the rest.

(7) *The long, filamentous, motile streamer.* (Figure 6 f).—This is peculiar and most characteristic. It is especially met with in blood drawn some time previously, although we have also seen it in perfectly fresh blood. A pore seems to form in the erythrocyte membrane and through it the cytoplasm streams out in the form of a long, flexible, filamentous form closely simulating a very long spirochæte. There is no knob or bead at the end, which is rounded and not pointed. This form may attain enormous lengths, beginning as a small protrusion 4 to 5μ in length it may grow to 25 or even 40μ, and not infrequently appears to stretch from one red cell towards another some distance away. As a rule this streamer is single, but on a very few occasions we have seen two produced simultaneously by the same erythrocyte.

Finally this form becomes detached from the cell. It now appears as if actively motile, twisting and turning about, not infrequently knotted upon itself, and often (probably from the presence of adherent hæmoconia particles) appearing as if shedding granules. It is somewhat refringent, but not markedly so. In a vaselined preparation it will be found that these forms are especially encountered near the edge of the preparation where presumably surface tension effects are maximal. The long thin motile streamer is the commonest form of pseudo-spirochæte met with in blood preparations.

(8) *The leptospira artifact.* (Figure 6 g).—This has been so fully described in the above memoir that we here need only mention it. It may prove of considerable difficulty to workers on leptospira infections. Its motility varies from sluggish to actively motile, its length from 5 to 20μ, but usually 8 to 9μ, although in some preparations short forms, 4 to 5μ are seen. In appearance it simulates a typical leptospira with one important difference, the ends are not looped but beaded and unmistakably so. The body is thicker, more rigid and more refringent than that of No. (7), but the terminal beads are always brightly refringent. From time to time it catches the light and suddenly becomes brightly refringent. Not infrequently it becomes attached by one or both bead-like ends to the slide or cover slip, whilst it also shews the diving movements so characteristic of a spirochæte and often simulates a dead spirochæte. We have never seen it attached to a red corpuscle but it has a special habit of diving under and disappearing from view beneath a red cell. The School has recently purchased a set of cinema films from Messrs. Pathe Frères and one of them is a particularly fine film of a culture of *L. icterohæmorrhagiæ* as seen under the dark ground. We have twice studied this film upon the screen, and so closely does this dengue artifact simulate a leptospira that we could almost identify the film as one from a dengue culture, except for the immense number of parasites present in the field.

(9) *Bacteria* of extraneous origin may be encountered, especially in preparations from furred animals. They are usually unmistakable. One which we have repeatedly seen in blood preparations from rabbits and monkeys is a short, squat little bacillus with two terminal tufts of fine, scarcely visible flagella. It remains motionless for a short time, then suddenly and very rapidly jumps to another spot, sometimes changing direction two or three times in transit, and then stops and becomes motionless again.

If our memoir does nothing else, we hope that it will at least serve as a warning as to the extreme necessity for full controls in all experimental work upon spirochætal infections. The Calcutta epidemic has now ceased (20th October, 1923), and for the present no further work upon the problem is possible at the School.

THE DETERIORATION OF INSULIN IN INDIA.

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WE desire to issue a warning as to the use of insulin imported into India under conditions which may permit of deterioration in potency.

Our experience is based on a trial of insulin of American manufacture prepared by one of the first firms to receive a license to make it and of the original potency of which there can be little doubt. The insulin made by this firm has been extensively used in the United States, and reports in the medical journals show that it has been very satisfactory.

Our supply was purchased from a local firm in Rangoon who had obtained it, not direct from the manufacturers, but through a reliable and well-known firm in London. Transit between London and Rangoon was not made in cold storage and the insulin was not kept in cold storage during the three weeks it remained in Rangoon before it was purchased. We have no knowledge of the date of manufacture nor of the conditions of handling before it was despatched to Burma.

The first trial was made on a severe case of diabetes, a European, aged 36, whose condition was first diagnosed in 1920. Prior to that year he had weighed 12¼ stone and by 1921 his weight had come down to 8¼ stone. In the following year he lost another 7 lbs. and had to reduce his diet to 1,180 calories, consisting of carbohydrate 10 grms., proteid 60 grms., fat 100 grms. to keep his urine sugar-free. He became progressively worse, and insulin treatment was commenced on 11th September, 1923. For a few days before the first treatment his diet was raised to 2,000 calories.

The results of his first insulin injection were as follows:—

9 a.m.—Urine Sugar 5.7 per cent.
9-15 a.m.—Blood Sugar 0.51 per cent.
9-20 a.m.—10 units insulin.
9-45 a.m.—Meal of carbohydrate 25 grms., proteid 16 grms., fat 70 grms. (Total calories 794).
10-15 a.m.—Blood Sugar 0.49 per cent.
11-15 a.m.—Blood Sugar 0.39 per cent.
12-15 p.m.—Blood Sugar 0.37 per cent.
Ten units were given in the same evening.
On subsequent days the doses were:—
12th Sept.—10 units and 15 units.
13th Sept.—15 units and 15 units.
14th Sept.—15 units and 20 units. (Diet reduced to 1,700 calories).

Another series of tests were made on 15th September:—

9 a.m.—Urine Sugar 7.7 per cent.
9 a.m.—Blood Sugar 0.48 per cent.
9-30 a.m.—25 units insulin.

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10-30 a.m.—Meal of carbohydrate 17 grms., proteid 14 grms., fat 58 grms. (Total calories 666).
11-20 a.m.—Blood Sugar 0.44 per cent.
12-20 p.m.—Blood Sugar 0.44 per cent.
12-20 p.m.—Urine Sugar 8.3 per cent.

It will be seen that a slight reduction in blood sugar was obtained with a dose of 10 units of insulin from the phial used in the first test, and that the reduction obtained with 25 units from another phial at the second test was almost inappreciable.

These results indicated a serious loss of potency, and the preparation was accordingly submitted to animal tests. The insulin unit is calculated as the amount which, when injected into a rabbit of 1,000 grammes weight, will lower the blood sugar to 0.045 per cent. at which point convulsions will ensue. Two rabbits starved for 24 hours, each weighing 2,000 grammes, were used.

Rabbit No. I.

10 a.m.—Blood Sugar 0.15 per cent.
10-30 a.m.—Two units insulin intravenously.
11-30 a.m.—Blood Sugar 0.13 per cent.
12-30 p.m.—Fifty units insulin intravenously (different phial).
2-30 p.m.—Blood Sugar 0.124 per cent.
The animal was kept under observation and showed no symptoms in four hours.

Rabbit No. II.

10 a.m.—Blood Sugar 0.22 per cent.
10-30 a.m.—10 units insulin intravenously.
11-30 a.m.—Blood Sugar 0.105 per cent.
12-30 a m.—10 units insulin intravenously.
2-30 p.m.—Blood Sugar 0.13 per cent.
3-30 p.m.—100 units insulin intravenously.
The animal was kept under observation and showed no symptoms in four hours.

The results show that 25 times what should have been a convulsant dose failed to produce any symptoms in rabbit No. I and that the effect on the blood sugar of this animal was negligible. In the case of rabbit No. II. a a first injection of five times the convulsant dose produced a slight fall in the blood sugar and a second similar dose produced no appreciable further effect. 100 units were then given to this animal without producing any symptoms.

The insulin as tested in this way was obviously of less than one-fiftieth of its original potency and of no value for treatment.

Another stock of insulin was obtained for trial from a well-known firm in Calcutta. This was of British manufacture and dated June 1923. It was tested on 27th September, having arrived by parcel post on 25th September and not in cold storage during transit from Calcutta.

The first test was done on a starved rabbit of 1,200 grammes weight.

9-30 a.m.—Blood Sugar 0.21 per cent.
10 a.m.—20 units insulin.
11 a.m.—Blood Sugar 0.124 per cent.
12 noon.—Blood Sugar 0.10 per cent.
1 p.m.—Blood Sugar 0.11 per cent.
2 p.m.—Blood Sugar 0.132 per cent.

The animal was kept under observation and showed no symptom. Approximately twenty times the convulsant dose produced only a temporary lowering of the blood sugar and did not reduce it to the level required from one unit.

This stock also had only retained a minute proportion of its original efficiency.

This short experience of insulin and the tests made indicate that there is a great risk of deterioration in potency of insulin imported into India. It is obviously necessary that the conditions of import and storage required to ensure that insulin will not become inert before it can be used should be determined. If this is not done, there will be a considerable risk of discrediting its use and value, and much disappointment will be caused both to medical practitioners and their diabetic patients in India.

We would suggest that before any further import of insulin for general sale is carried out a definite series of tests should be made in regard to the following points:—

(a) Effect of freshness of product.

(b) Effect of import in cold storage.

(c) Effect of cold storage on arrival.

(d) Period over which it remains potent after arrival under different conditions of storage.

It is very important that all insulin should be dated by the manufacturers. It is not unlikely that it may be found necessary to re-standardise insulin after import into India and very definite measures of control of its distribution will be necessary.

As an instance of the distribution of insulin in a manner which cannot but be regarded with alarm, we have recently found that it can be purchased here from a local photographer. The conditions of medical practice and the sale of drugs in India make it even more necessary than in European countries to exercise a careful control of the distribution of a delicate physiological product of this nature.

[NOTE.—It will be seen from the striking case reported by Major Proctor, I.M.S., in our issue for last November that *some*, at least, of the insulin purchased locally in India, is fully potent. Dr. J. P. Bose's article in our December number shews also that his earlier supplies, (Lilly and Co.), were fully potent. On the other hand he reports that later supplies, of English manufacture, had only retained one-third of their original potency. The letter from Major Hughes, I.M.S., in the correspondence columns of this issue goes to confirm the findings by Major Taylor and Dr. Douglas.

Obviously the question of the keeping properties of insulin in the tropics is a matter of most urgent importance; so important indeed, that Government control and examination of insulin supplies in this country appear to be desirable.—EDITOR, *I. M. G.*]

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THE TREATMENT OF SYPHILIS BY "BISMUTH."

By C. F. CHENOY, M.B., B.S., D.P.H. (London),

Fellow of the Royal Institute of Public Health, (Lond.), Civil Surgeon, H. E. H. The Nizam's Medical Service.

THE original papers on this subject were contributed in 1921 by Sazerac and Levaditi. (1)

In 1923 Levaditi (2) contributed an article in English, in which he justly puts forward the claims for the use of bismuth. He shows healing by cicatrization of the lesions in all stages of syphilis. He is sure that it is equal in efficacy to arsenical preparations and better than mercury, and claims a superiority over arsenic in those cases which are resistant to arsenic and mercury. It is also shown experimentally in rabbits and in acquired syphilis in man that bismuth possesses a powerful curative action. Fournier and Guenot (3) used this remedy in a large number of cases with good results. Professor Block (4) made use of it in the Dermatological Clinic of Zurich and found that the most suitable preparation of bismuth was "Neo-Trepol".

This treatment undoubtedly has a very rapid effect upon all three stages of syphilis. The primary sore loses its induration and heals very quickly. The secondary lesions—rashes, condylomata and mucous patches—vanish. In the tertiary stage the arthritis, the gummata and perforation of the palate show improvement and gradually disappear. The gummata gradually become clean and heal. Professor Block does not place much confidence in the bismuth treatment for cases of tabes, but one case of tabes which I had under treatment quickly showed a change after completing a course of eleven injections. The patient's husband having been transferred, I have now lost sight of the case.

The following notes of a few interesting cases will illustrate the clinical course of treatment with bismuth:—

1. Patient aged 25, English. Primary sore on glans penis; spirochætes present. Trepol was used. After the 4th injection spirochætes were absent and the papulo-erosive chancre showed signs of skinning over. After the 6th injection the swelling of the epitrochlear glands disappeared and the Wassermann reaction was negative after 12 injections.

2. Patient aged 37, Scotch. Primary sore on penis; condylomata; spirochætes present. Trepol used. After the 3rd injection no spirochætes were found. The condylomata showed signs of eradication. The Wassermann reaction before treatment was +++. After eight injections it became doubtful and negative after 14 injections.

3. Patient aged 45, Parsi. Arthritic pains. History of syphilis 15 years previously. Two 606 injections 10 years ago. No other sign or symptoms. Wassermann ++. After four injections the pains disappeared. The Wassermann reaction was doubtful after 10 injections.

4. Patient aged 29, English female. Rash and condylomata; Wassermann +++; sore throat; Herxheimer's sign present; Neo-Trepol used. After the third injection the rash disappeared; after the fifth injection all symptoms were lost. The Wassermann reaction remained doubtful even after 12 injections.

5. Patient aged 18, Hindu. Hutchinson's teeth; perforation of the palate; nodes on tibia. No marked improvement until the seventh injection when the patient could gargle his mouth without water entering the nose. The perforated part was still weak and had not completely healed. The headaches disappeared after the third injection. The nodes disappeared after 16 injections.

6. Patient aged 31, Hindu. Tongue swollen, fissured and pulpy; could not roll or move it. Speech affected. After 4 injections the speech became clearer and the tongue less pulpy. After 10 injections all trouble disappeared and the speech was perfect.

7. Patient aged 46, Mohamedan, with a gumma about 3 inches in diameter on the right leg, serpiginous with edges indurated. History of syphilis 20 years before. Was treated 10 years ago with 606, 2 injections. After 6 injections of Neo-Trepol the slough disappeared, the margins healed and the ulcer showed signs of skinning over. After 10 injections the ulcer healed with hardly any scar.

8. Patient aged 30, Hindu female. Tabes present. After 5 injections the gastric crisis and lightning pains disappeared; after 12 injections all signs disappeared, but the headaches still persisted although not as severe as before. The patient left me as her husband was transferred.

9. Patient aged 33, Mohamedan. Had a chancre 8 years before; treated with 606, two injections, and three N.A.B. injections. In all 5 injections. Developed gastric trouble; was fast running down. On examination I found the stomach dilated and the liver enlarged. The epitrochlear glands could be easily felt, as big as hazelnut. Nervous breakdown; iritis present. 18 injections of Neo-Trepol were given. Patient doing well. Wassermann reaction doubtful.

Thus it will be seen that there is an immediate improvement in clinical symptoms under bismuth treatment, but as regards the serological reaction of the blood I have had no opportunities to try further and to give an opinion. Levaditi (5) in 1922, has shown its serological effect. I believe there is not much to choose between arsenic and bismuth with regard to serological results. The clinical and bacteriological effects are as strong and are at any rate not inferior to those with arsenic, but when we compare these drugs as regards tolerance we find that bismuth, although toxic, does not exert such a toxic action as does arsenic. In its toxic action bismuth resembles the insoluble salts of mercury in producing lesions of the mouth, intestines, stomach, and kidneys. The commonest ill-effect of the bismuth preparation is the appearance of a bismuth line on the gums and if treatment is not then checked it produces stomatitis and eventually ulceration. This bismuth line is caused by a deposit of sulphide of bismuth in the cells of the connective tissue of the mucosa and also in the endothelium of the vessels. In the literature mention is made of bismuth poisoning, (6). Wolfer mentions cases in which nephritis has developed. This, though rare, is transient and hardly necessitates stoppage of treatment. According to Wolfer, mercury is

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much more toxic than bismuth. Both are capable of being stored up in the muscles for a time but bismuth is the more easily absorbed of the two. Levaditi says that bismuth injections are equal to arsenic and better than mercury and are especially applicable to cases resistant to arsenic and mercury. Escher (7) and other observers (8) are also of the same opinion. Some authors such as Emery and Morin (9) are of opinion that a combination of bismuth and arsenic, with mercury as an accessory, is the best line of treatment for syphilis.

Many varieties of bismuth preparations are on the market including single and double salts, organic compounds, colloids of bismuth and the metal itself in fine state of division:—

(a) Trepol = tartro-bismuthate of potassium and containing 64 per cent. of bismuth.

(*b*) Neo-Trepol=precipitated bismuth in an isotonic medium containing 96 per cent. of bismuth.

(*c*) Oleo-Bi (Roche) (10)=a fine suspension in oil of bismuth oleate.

(*d*) Quinio-bismuth=an iodine bismuth compound of quinine.

I have used Trepol and Neo-Trepol, and, as shown above, have obtained better results with the latter. As regards poisoning it is easily managed and rarely met with. In one case I pushed the treatment to as much as 4 c.c. per injection without any signs of poisoning. In cases of acute poisoning I found temporary stoppage of treatment, with injection of intramine, and potassium chlorate mixture by mouth very helpful.

To sum up, there is no doubt that its clinical and bacteriological effects are excellent but as regards its serological side I am not in a position to give a verdict as most of my cases were treated in the district, but the others where the blood was examined (10 per cent.) gave a decided change in the Wassermann reaction. I believe bismuth to be in no sense inferior to arsenic and there is no doubt that it is superior to mercury as an anti-syphilitic remedy. I believe bismuth is probably destined to replace arsenic in time, anyhow its great advantage is that it is painless, easily administered, not at all dangerous, and if not more effective, it is at least as effective as arsenic.

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A Mirror of Hospital Practice.

A CASE OF PANCREATIC CYST IN A CHILD.

By A. K. RAGHAVAN, M.B., B.S.,
Palghat, South Malabar.

As this condition is extremely rare in children and is likely to be overlooked, a short account of a case may be of some interest.

Parameswaran, a Nair boy, aged 3½ years, was admitted on July 21st, 1923, into Rao Bahadur Dr. Krishnan's Hospital, Palghat, with a distended abdomen, severe constipation and occasional vomiting. Before admission to hospital the child had been treated for a few days as an outpatient of the local Municipal Hospital for worms with no improvement.

The swelling was first noticed by the mother two months previously, and she said that it had gradually increased in size ever since. Constipation and vomiting began five days before admission. There was no history of fever or trauma. The urine passed was always normal in quantity. It was rather strange to find that the child, even though 3½ years old, was still breast-fed.

The child was weak and emaciated, the abdomen markedly distended, breathing difficult, temperature normal, pulse rapid and feeble, urine normal, temper very irritable.

The swelling in the abdomen was seen to be most marked above the umbilicus. On palpation a definite round tumour was felt in the middle of the abdomen in the epigastric and umbilical regions. The tumour was fixed and did not move on respiration. There was distinct dullness on percussion over the tumour, the area surrounding it was tympanitic. A fluid thrill could be elicited to a certain extent.

To relieve constipation the child was given drachm doses of paroleine by the mouth up to one ounce, and glycerine enemata at first, and soap and water enemata later per rectum with fairly good results. Vomiting became more frequent and troublesome, however, and the child was getting weaker.

As the pressure symptoms were getting very marked it was decided not to delay the operation. So, on the following day the child was prepared for operation and put on the table. As the tumour was situated centrally I made an incision in the median line of the abdomen starting two inches below the xiphoid process and extending an inch and a half below the umbilicus. On opening the abdomen I found a greyish white cyst lying between the stomach above and the transverse colon below. The cyst wall was incised for an inch and about 3 pints of black coffee coloured fluid let out. On exploring the cavity with the index finger I found the cyst

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fixed to the posterior abdominal wall. A drainage tube was put in, the cyst wall sutured to the parietal peritoneum and the abdomen closed.

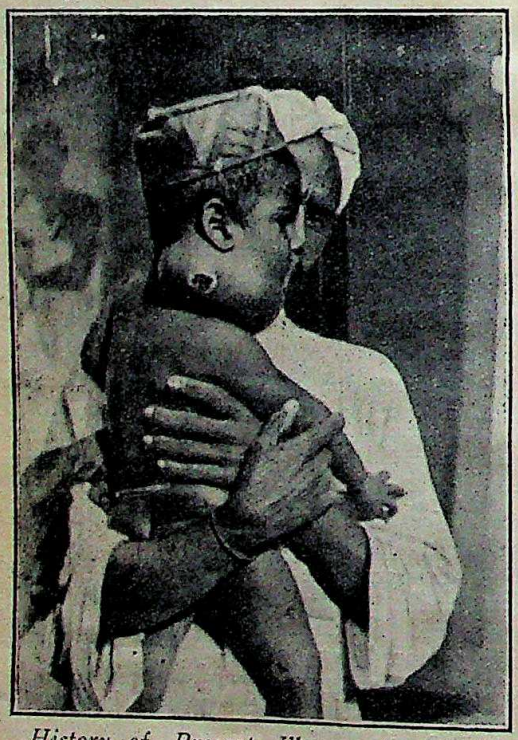
After the operation vomiting ceased and the bowels moved freely. The child was fed on cow's milk and rice water in addition to the mother's milk.

As there was no discharge from the cavity the drainage tube was removed on the 4th day and a simple gauze drain substituted. The sutures were removed on the 8th day. The sinus completely healed up and the child was discharged cured on August 20th, 1923.

A CASE OF LYMPHATIC CYST OR HYDROCELE OF THE NECK.

By A. K. RAGHAVAN, M.B., B.S.,
Palghat, S. Malabar.

ABDUL RAZAK, a Mohamadan male child, aged one year and nine months, was admitted into Rao Bahadur K. Krishnan's Hospital and Nursing Home, Palghat, on 29th August, 1923, for a swelling in the neck. The child was brought by the parents with some reluctance, as a local surgeon whom they had consulted a few days before pronounced the case as inoperable.



History of Present Illness.—A red linear mark about an inch in length was noticed at birth on the right side of the neck an inch and a half below the lobe of the right ear. Some time later a swelling appeared in the same region which gradually increased in size until it assumed its present form. There was no pain at any time, the only inconvenience being a mechanical one in moving the head to the right and in lifting up the right arm, due to the size and location of the tumour. A fortnight before admission the child was taken to an Ayurvedic physician for treatment. He branded the skin at the centre of the tumour, which not only failed to arrest its growth but produced a painful ulcer. This treatment is invariably and relentlessly tried by this class of physicians as a last resort in all kinds of tumours.

Condition on admission.—The child is fairly well nourished. A smooth tense tumour more or less elliptical is situated on the right side of the neck extending transversely from the median line of the neck to ¾ inch short of the posterior median line. The diameters are 7¾ inches transversely and 3½ inches vertically. The tumour presents a bilobed appearance, the sterno-mastoid muscle passing over it in the middle. The ulcer, a little bigger than a half anna piece, is situated about the centre of the tumour. The tumour is not fixed. Fluctuation present. Temperature and pulse normal. No blood changes. Urine normal. Diagnosed as a case of hydrocele of the neck and posted for operation.

On 26th September the cyst was excised under chloroform. Two semilunar incisions were made transversely to exclude the area of ulcer from the field of operation. The cyst was separated from its capsule on all sides except at its base. As its removal intact was impossible without dividing the sterno-mastoid, a puncture was made posteriorly on the wall of the cyst and the fluid let out, the fluid being yellow and serous like that of an ordinary hydrocele. The posterior part of the cyst was then separated from its base and brought anteriorly underneath the sterno-mastoid. The whole cyst was separated out from its remaining attachment and removed completely. Anteriorly the cyst was adherent to the internal jugular vein from which it had to be dissected out most carefully. The contents of the carotid sheath were exposed on removal of the cyst and they were found rather widely spread.

The child had an uneventful recovery except for a small sinus in the posterior part of the incision which had to be dressed every day for a fortnight.

A CYSTIC TUMOUR OF THE OMENTUM.

By BHAGWAN DAS, L.M. & S.,
Civil Surgeon, Bilaspur.

A HINDU boy, Fularam, aged about 12, was admitted for the treatment of a prominent swelling in the abdomen which was painless and unaccompanied by any other symptoms. Duration five months.

History of Previous Illness.—Nothing particular.

Family History.—Both parents died of some continuous fever. One brother aged 30 years

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and a sister aged 15 are healthy. No history of hereditary disease in the family.

History of Present Illness.—Five months ago the boy suffered from some slight pain in the right part of abdomen for about a week, after which a swelling began to appear in the right and upper part of his abdomen. It rapidly increased during the first month, and then gradually until it had acquired the present size. There were no other complaints, except a feeling of distension and a little loss of appetite.

Local Condition.—A tumour present of about the size of a melon, occupying almost all the upper part of the abdomen and reaching as far below as the umbilicus. It was freely movable in the abdomen and the overlying skin was not adherent to it. It was dull to percussion but this dullness was not continuous with the area of liver dullness. Liver and spleen not palpable below the costal margins. There was no distension of the superficial abdominal veins, no jaundice and no swelling of the feet or anasarca. The patient was slightly anæmic and on examination of his urine was found to pass albumen in abundance.

Diagnosis.—Cystic tumour (probably hydatid cyst of the liver) was diagnosed and the boy was prepared for laparotomy in the usual way.

On opening the abdomen the tumour presented itself in the abdominal opening. It was adherent to the omentum in front and firmly adherent to the mesentery and to the upper part of the jejunum behind. After cautiously separating the adhesions the tumour was removed. It had a thick sac and contained dirty looking greenish fluid. The intestines being firmly adherent, I had to separate the adhesions from the side of the tumour with the result that the friable wall gave way and a little fluid entered the abdominal cavity. The cavity was flushed with hot saline. There was practically no bleeding during operation and the wound was stitched up. The patient had a rise of temperature for the first two days after operation, and the morning after operation he vomited two or three times and some peritonitis was suspected. But on the third day the temperature came down to normal and he had no other trouble. On the twelfth day all the stitches were removed and the wound was found to have healed soundly by first intention. The boy was discharged cured from hospital.

This condition is, I believe, a rare one.

TWO SURGICAL CASES.

By K. S. RANGANATHAN, L.M.P.,
Resident Medical Officer, Government Headquarters Hospital, Anantapur.

I. *A case of Vesical calculus with bilateral Hydronephrosis.*—Patient T., a young boy of about 12 years, was admitted to this hospital on 9th August, 1923, for dribbling of urine and pain in the penis. Duration of illness:—1½ years.

His bladder was sounded under chloroform and a vesical calculus diagnosed. He was posted for operation on 13th August, 1923, was given a mixture of urotropine and acid sodium phosphate and his bladder washed twice daily with warm boric lotion. On the same evening he had a rise of temperature to 100°F. and complained of increased pain. Pulse 104 per minute; respiration 28 per minute. The fever was thought to be result of the sounding and he was given Mist. Quininæ (grs. ten to one ounce).

Tenth morning.—Temperature nomal, but he still complained of great pain in the suprapubic region. There was dribbling of blood-stained urine. Patient very irritable and refused diet.

Tenth morning.—Temperature normal, but Urine still blood-stained. Bladder not washed out as patient was very unwilling.

Eleventh morning.—Patient restless. Twitching of the muscles of the face. Got fits at 8 a.m. which lasted for half-an-hour. Became slightly comatose at 10 a m.

Mag. sulph. 6 drachms given at once in two ounces of water. Subcutaneously 10 ounces of sodii bicarb solution (grs. 60 to the pint).

Hot fomentations ordered for the loins and a rectal injection of 5 per cent. glucose in normal saline solution given.

Twelve noon.—Patient deeply comatose. Temperature sub-normal. 97.8°F. Respiration 34 per minute and laboured in character.

Six p.m.—Deeply comatose. Pulse 110 per minute, soft and small. Respirations hurried and shallow. Moist crepitations in the bases of both lungs. An injection of strychnine and digitalin given and glucose in saline repeated rectally.

Twelfth morning.—Temperature sub-normal. 97.8°F. Pulse imperceptible at the wrist. Did not improve even after a saline infusion. Patient bathed in profuse perspiration. He died at 9 a.m.

Post-mortem notes.—Bladder enlarged and hypertrophied. Section showed congestion of the bladder wall, which was about an inch in thickness. In the cavity of the bladder was a kidney-shaped stone, pale brown in colour. It weighed one ounce and forty grains and measured 1¾" × 1" × 1". Its surface was very rough and tuberculated.

The ureters were thickened and very much dilated throughout their length—large enough to admit the thumb; tortuous and pouched in some places with a close network of blood vessels on the outer surface. Their inner surface was dark in colour.

Kidneys.—Left. Looked large and felt like a bag containing some fluid. Measured about 6" from pole to pole and 4" at the hilum. On section pelvis dilated to about the size of a

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lime, calyces expanded into cavities containing clear urine. Renal substance completely atrophied. Cortex thinned out and only about an eighth of an inch in thickness.

Right.—Adherent to the surrounding tissues. Enlarged and heavy. Measured 5″ × 3½″ × 3″. On section pelvis dilated, renal tissue hypertrophied and congested, calyces expanded into small cavities and distended with urine.

Other organs normal.

Bilateral hydronephrosis is caused by obstruction at the neck of the bladder or in the urethra. It is not the immediate result of the back pressure on the kidneys, because the cavities of the bladder and ureters are not directly continuous, their orifices being valvular. But it is indirectly due to the compression of the ureters as they pass obliquely through the hypertrophied and indurated bladder wall.

Perhaps the roughness of the stone and not its size is the more important factor in causing the hypertrophy. For if it were not so, what would be the condition of the kidneys in cases of stone which require removal by midwifery forceps?

II. *A case of primary cancer of the liver.*—Patient N., a cooly, aged about 55 years, sought admission to this hospital on 16th August, 1923, for a painful swelling in the right side of his abdomen. Duration of illness two months.

History of present condition:—Two months ago the patient felt some breathlessness, especially after a full meal; and he had to lessen the quantity of food to avoid it. About two weeks later he noticed a small swelling in the right side of his abdomen. It was at first painless but became painful ten days later. The pain grew worse as the swelling increased in size.

Previous history.—He gave a history of gonorrhœa, but none of dysentery, syphilis or alcohol.

Condition on admission.—Patient fairly well nourished, slightly anæmic. Abdomen distended in its upper part. There was a tumour of the size of an orange in the right hypochondriac area about 1″ below the costal margin, hard, tender to the touch, with the skin over it tense and shiny. Not movable, but moved slightly with respiration. Dull on percussion, the dullness being continuous above with that of the liver. Lower limit of dullness, four finger breadths below costal margin.

Stools.—No amœbæ found.
Blood.—Wassermann reaction strongly positive
Differential leucocyte count.—

Polymorphonuclears	..	57 per cent.
Large mononuclears ..	..	7 "
Lymphocytes ..	..	31 "
Eosinophils ..	..	5 "

Urine.—Specific gravity, 1020.
Acid reaction.
No albumen.
No sugar.

Diagnosis.—Was between malignant growth and syphilitic disease of liver, other conditions such as hydatid cyst, amœbic abscess, etc., having been eliminated. The positive Wassermann reaction was in favour of syphilis and indicated a trial with antisyphilitic treatment.

The patient was put on potass iodide grs. 10 t. i. d. on 19th August, 1923. On the 22nd the patient complained of unbearable pain and the swelling had also considerably increased in size since admission. An exploratory laparotomy was done on 23rd August, 1923. The parietal peritoneum was found adherent to the liver. The liver was very much enlarged, its lower margin extending to a little above the umbilicus. Blood stained fluid welled up through the wound. The surface of the liver was nodular. The lower portion of the right lobe was soft and gave the feel of a cyst. It was diagnosed as cancer and the abdomen was closed. Thereafter there was constant oozing of blood stained fluid into the dressings requiring their renewal frequently. The patient died at 5 a.m. on 27th August, 1923.

On post-mortem the right lobe of the liver was found enlarged to nearly twice its normal size. It was adherent all over and could only be removed with difficulty. Surface nodular. Section:—cuts with resistance; is greyish white in colour. The lower part of the right lobe breaking down. A careful search was made for a primary focus, but none could be found. A section was sent to the pathologist and the following is his report.

"The peri-portal connective tissue is much increased in the direction of peri-portal cirrhosis. Large areas of section are necrotic and granular. Liver trabeculæ are replaced by epithelial cells probably arising from liver cells themselves. They show darkly stained nuclei, eosinophile protoplasm and other evidence of recent formation. The section is one of carcinoma of the liver and has features of a type of primary cancer of that organ."

Interesting features in this case are:—

1. The rapid course of the disease. It killed the patient within a period of ten weeks.
2. The absence of jaundice.
3. The positive Wassermann reaction.
4. The absence of a history of alcohol. Cirrhosis of the liver is believed to bear some relationship to cancer of that organ, as does chronic mastitis to cancer of the breast.
5. The absence of a history of dysentery. Dysentery, particularly the bacillary form, is believed by some to be the cause of a type of interstitial hepatitis, which may, like cirrhosis, predispose to hepatic cancer.

In conclusion, I have to thank Dr. H. S. Hensman, M.R.C.S., L.R.C.P., for kindly permitting the publication of the above cases.

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By W. W. JEUDWINE,
LIEUT.-COLONEL, I.M.S.,
Civil Surgeon, Delhi.

On four occasions he coughed up small hard particles of calcified material which were probably the remains of a calcified gland *Tubercle bacilli* were once found in small numbers in his sputum.

On 9th December he was put on to Histogenol Tablets, four daily hour before meals. He was then on the 16th started on a course of Cyto-Serum and Hæmo-Cyto-Serum (intramuscular injections) and given Tricalcine after meals.

His weight gradually increased from 6 st. 12 lbs. to 7 st. 12 lbs. while he was in hospital and it increased to 9 st. 2 lbs. before he left Delhi in March. He was fat all over. His physical signs in the lungs cleared up partly.

He had a slight rise of temperature when he started the intramuscular injection of Cyto-Serum and Hæmo-Cyto-Serum but his improvement was maintained. If this was a case of pure tubercle the result obtained is all the more unexpected.

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Indian Medical Gazette.

JANUARY.

THE NEXT STEP?

SIR GEORGE NEWMAN, Chief Medical Officer of the Ministry of Health of the United Kingdom, is able to point with justifiable pride to the solid achievements of preventive medicine in England.

During the past 30 years the yearly death rate from typhoid fever has fallen from 229 per million to 12 per million, small-pox deaths have fallen to 14 per million, tuberculosis from 3,189 in 1847 to 854 per million, and the infant mortality in great industrial centres to a fraction of what it used to be.

But there is another side to the picture; he finds that non-tuberculous diseases are responsible for 18 per cent. of all the deaths in Great Britain, diseases of the heart and circulation for 16 per cent., cancer for 10 per cent., and consumption for 9 per cent.; he asks what preventive medicine has to say to these figures. His solution lies in the permeation of the medical curriculum with the spirit and methods of disease prevention by a special course of instruction in preventive medicine and by special attention to the preventive aspect of clinical work. He suggests that when a patient comes for treatment the question should always be asked "Why is this patient here?", so that when the medical man comes to the practice of his profession he may get into the habit of asking himself "What can I do to prevent this?"

The true spirit and ideals of medicine could not be better expressed, and we in India need to catch this spirit and these ideals. It is true that we have not yet taken the first step which has been taken in England and America; we are still struggling with diseases like cholera and plague and leprosy and relapsing fever which have been banished in other countries by the adoption of a moderate standard of sanitation, and the greatness of the task which lies before us has perhaps created in us a sense of our helplessness in the presence of the problem of disease prevention.

In India as elsewhere the greatest pecuniary rewards are for those who try to patch up the damage already done by disease to the individual, while those whose business lies in prevention, whether by research or by public health activities, are the hewers of wood and the drawers of water of the profession. The question for us is, wherein lies the remedy? There is one thing that the doctor can do in India, he can prove the sincerity of the noble professions which are made by medical men by taking up his share of the burden of preventive medicine; he can regard himself not merely as the paid servant of the patients whom he relieves, but also as the unpaid missionary of disease prevention. He can explain to his patients how they came to fall into the hands of doctors and how best they can avoid this unpleasant experience in future. If only every doctor were to follow this course, a knowledge of disease prevention would gradually extend among their patients and from them to the masses of the population. The fatalistic view of disease would gradually be replaced by the view that most diseases are the result of wrong living, of failure to adapt ourselves to our environment, and to adapt our environment to ourselves. The mere fact that we have so much leeway to make up as compared with more advanced countries is not a reason for inaction, it should be a stimulus to greater activity on our part. Every doctor all over the land should be a public health worker and an investigator. He should regard it as a disgrace to the medical profession that so much preventible disease is allowed to exist and that so little is being done to prevent it. Even if the work be unpaid, it will yield him a great dividend in giving him a fresh interest in his profession and in the higher satisfaction which comes from work done for the common good rather than for pay.

It is even likely that such activity will not be opposed to his personal advantage. The doctor who shows that he is interested in his patient's welfare apart from the immediate duty of repairing the damage which he is called in to attend to, will certainly obtain the recognition of the community and this will take the tangible form of increasing popularity both socially and professionally. The solution of the outstanding problems of medicine will be attained much more quickly if every clinician does only a little as an observer of the conditions under which certain diseases appear; the combined observations of thousands of doctors all over India will be of immense help in clearing up the unsolved problems. There is another aspect of the question which has not been sufficiently grasped even by the medical profession of England; we do not make half enough use of the knowledge which we already possess. Let us note a few examples of this.

It is notorious that respiratory infections have not yielded to modern sanitation to any great extent: the reason appears to be that while we talk glibly enough about droplet infection we go on acting as if such a thing did not exist. We know about alimentary canal infections and every educated person is careful of his water supply and of the cleanliness

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of his food, the result is a great reduction in alimentary infections in all advanced countries. It is not so with respiratory infections, we know of their existence but do not hesitate to inhale the air which is being filled with myriads of microbes by a patient who suffers from influenza or the hundred and one other kinds of respiratory infection. It has become the fashion to drink pure water but it has not yet become the fashion to inhale pure air, and until the doctors themselves introduce the cult of clean air we cannot expect to see any great diminution in respiratory diseases. Quite recently we called attention to the necessity for tackling rheumatic endocarditis at its very source, and there is little doubt that this disease could be abolished with many others by avoiding droplet infection of all kinds.

A long list might be made of diseases which would come under complete or partial control if we adopted the fashion of breathing uninfected air: measles, whooping cough, tonsillitis, diphtheria, bronchitis, influenza, acute rheumatism, pneumonia and to large extent tuberculosis itself would promptly cease to hold sway if we refused to inhale germs. In India it would be easy for us to take this matter in hand: we have not the same difficulties to contend against as those who live in cold and damp climates where open air life is unpleasant for a great part of the year.

It may take a long time to rub in the lesson of clean air and of keeping the people who cough and sneeze in their proper place, which is in the open air where they are better off and cannot harm their fellows. One would have thought that the great influenza pandemic would have given the necessary impetus to the pure air cult, but apparently the world is not yet ripe for the new doctrine, perhaps the next great epidemic will compel our attention at a cost of some millions of lives. The penalty for neglect of observation and failure to apply the results of our observations is a very grim one, and nature will go on steadily exacting the toll until we take action. In the case of most diseases we are merely suffering the due punishment of our sins, and if the enormity of our misdeeds is to be estimated by the penalty which we have to pay, it must be great indeed.

In connection with droplet infection two lines of research remain to be followed out by investigators, one is to determine the range of bombardment of the various droplet infections, and the width of the air barrier which will suffice to protect against droplet infection under varying conditions, the other is to devise some means of getting rid of the infection which is carried by most of us in our upper air passages. A disinfectant gas or spray which will render the respiratory mucosa aseptic without causing undue irritation will be of enormous value to the world.

Reference has also been made recently in this journal to the avoidance of cancer. At last the experts are convinced not only of the part played by chronic irritation in its various forms in the causation of cancer, they even suggest in a half hearted and apologetic manner that it is desirable to avoid certain forms of irritation which are known to predispose to cancer; they still however lay great stress on the fact that the causation of cancer is a mystery, as if the causation of life itself were not a mystery. What the man in the street wants to know about cancer is how to avoid it; we know a great deal about this, but for some mysterious reason we hesitate to act upon our knowledge.

In these two matters of respiratory infection and cancer there is a curious mental kink which prevents us from taking the next step. It would be interesting if we could read what the medical writers of fifty years hence will have to say about us. They will certainly be greatly puzzled to account for our obstinate refusal to realize the possibility of making use of the knowledge which we have already acquired.

PALEOPATHOLOGY.

MEDICINE is fortunately something more than an art; it is also a progressive science with an ever widening horizon of interest. And there has recently come to hand a book which is so exceptional and of such interest that it perhaps claims attention in our editorial, rather than in our review columns.

Paleopathology is the latest, but almost the most fascinating of medical sciences. The science dates from 1774 when Esper of Erlangen described what he considered to be an osteosarcoma in a cave bear of the Pleistocene period. Since then many distinguished anatomists and pathologists have paid some scanty attention to the subject, notably Cuvier, Owen, Mayer, Leidy, Virchow, Eliott-Smith, Keith, Shattock, Klebs and others. But the observations of these distinguished authors are scanty and scattered, and it has remained for Dr. Roy L. Moodie, Associate Professor of Anatomy in the University of Illinois, who has for many years been studying the subject to now collect and coordinate our knowledge of the relatively new science into one single and intensely interesting volume.* Dr. Moodie's most valuable work is one of the very best expositions of American medicine that we have seen; it is beautifully got up and edited; is illustrated with a wealth of full page plates and etchings; includes a full bibliography and a complete index, and forms a fully detailed and intensely interesting exposition of our knowledge of the diseases of plants, animals and man from the first origins of life down to 600 A.D. The volume is one which it is almost impossible to summarise: it is probably one which will appeal chiefly to the medical librarian, the pathologist and the paleontologist, but even the general medical practitioner may take delight in these lavishly illustrated and fascinating pages. We do not suppose that the publication of this

* Paleopathology, an Introduction to the Study of Ancient Evidences of Disease, by Roy L. Moodie, Ph.D., Illinois: University of Illinois Press, 1923. Price $7.50, 567 pp., 117 plates and 49 text figures.

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volume will pay, but we cannot refrain from congratulating the University of Illinois on their courage in publishing so important a volume.

Going back to first beginnings, we note that the lesions dealt with refer naturally chiefly to lesions of bones, since very little else is present in fossilised structures. Life began somewhere in the Proterozoic era, some 50 to 100 million years ago. As to its exact origins modern science and philosophy have often speculated. Did life arrive on earth, as Arrhenius suggests, in the form of some living particle or spore-like form driven from the wilds of space or from the atmosphere of some other planet by the pressure of radiant light? Or,—amid the chemical and radio-active complexes of the still hot earth crust and the newly condensing oceans,—did some new and radio-activated lump of proteid suddenly acquire the life-principle? Whatever happened, bacteria are known to have been amongst the very earliest forms of life; they appeared in the Proterozoic era as non-pathogenic and free living forms, and have persisted ever since. Indeed the primitive protists may well have been of bacterial rather than of protozoal form.

From such a beginning the author leads us step by step and line upon line through the evidences in the eras. In the Paleozoic era and Cambrian period,—the age of invertebrates—disease was almost, if not quite, unknown. Later, in the Silurian period, traumatisms are found, whilst commensalism began,—a notable instance of the latter being the gastropods which attached themselves over the anus of crinoids in order to obtain nourishment from the latter. Hypertrophy of external organs or of bodily parts is next seen; and, at a very early stage, simple fractures and callus formation which are still aseptic. The isothermal mammals were not infrequently subject to such fractures—the oldest known example of such a simple fracture being that of the radius of a *Dimetrodon*. Here a collection of radiographs of fractures in ancient reptiles present to the reader a most remarkable combination of the results of modern scientific medicine with ancient injuries. Dinosaurs appear to have not infrequently sustained fractures as the result of fighting with their competitors; whilst even the Mastodon was not exempt.

Arthritis and osteo-myelitis are two of the earliest diseases to appear in the geological records, and here Dr. Moodie notes, with Huxley, how certain types of disease,—notably caries of bone and teeth, alveolar osteitis and various types of necroses and tumour formations—appeared early in geological time among the vertebrates and have tended to persist almost unchanged in character down to the present day. Spondylitis deformans appeared early; in the Paleozoic age there are evidences of dental caries, pyorrhœa alveolaris, and osteo-myelitis associated with the age of amphibians. In the Mesozoic, the age of reptiles, such lesions as periostitis, hæmangiomata, bone necrosis, caries, osteomatata and a curious condition of death in opisthotonos which may have been due to tetanus or similar infections, are to be encountered. Fossilized red blood corpuscles are first encountered in the Harversian canals of *Iguanodon bernissaertensis*, a European dinosaur of the Mesozoic era.

The question of extinction of races has always interested both biologists and sociologists. In Chapter XI Dr. Moodie discusses this most interesting problem. The gigantic amphibians and the labyrinthodonts, after a short but vigorous period of existence during which they ranged from Spitzbergen to Australia and from Germany to Wyoming, almost suddenly disappeared.

The extinction of the dinosaurs occurred gradually during the whole of the Mesozoic era, 9 to 22 million years ago. Disease can hardly be incriminated as the cause of extinction; was it their gigantic size (for some of them were 70 feet in length and 14 feet high), their general unweildiness, or the introduction of small mammals which fed upon their eggs that was responsible? Or did tsetse fly and *nagana* have anything to do with it, for tsetse appeared about the close of this era?

Passing from the Mesozoic to the Cenozoic eras we note actinomycosis as a new infection, this disease appearing in the mandible of a three toed horse from the Miocene period. Thread moulds were probably the first fungi to invade bone, but were probably relatively harmless. This era was probably one of relatively short duration.

With the Psychozoic era, 550,000 to 1,000,000 years ago, we come first to the progenitors of modern man, and here a wealth of pathological material is available. Hookworm infection appeared very early, the *Pithecanthropus* of Java having been probably infected, as well as the fossil gibbon *Proliopithecus*. War appears upon the historic scene at a very early date and bony injuries from stone arrow heads are well described. *Pithecanthropus erectus*,—approximately 500,000 years old,—shows an extensive exostosis of the femur, the oldest known pathological specimen in man. Trephining in ancient days was not uncommon, the subjects being usually females. A not infrequent operation for melancholia, as vividly illustrated in the frontispiece, was to make a crucial incision down to the cranial vault, to pour into the incision boiling oil, and possibly—in the highlands of Peru—to attempt to ease the subject's agonies by the application of coca leaves, chewed by the operator whilst operating. Not infrequently the operation was so severe as to cause subsequent ridges of callus formation upon the cranium. Amputation of finger joints in order to appease the gods was a frequent practice,—cave impressions of such mutilated hands 20,000 years old being found in Spanish caves from the late Paleolithic age. Pott's disease appeared very early in the history of the human race; it is recorded from Neolithic vertebræ of 5,000 B.C. and not infrequently among the ancient Egyptians. Clearly the tubercle bacillus has a very ancient history.

In ancient Egypt, as is well known, arterio-sclerosis was prevalent (and this—apparently—in the absence of both tobacco and syphilis); whilst other diseases recorded among mummies are small-pox, vesical calculus, schistosomiasis, rickets, and a curious frequency of osteoporosis of the skull, the true ætiology of which remains a mystery. Syphilis may—or may not—have been present,—probably not. Osteosarcoma was known, whilst trephining was common. Splints of a primitive and usually inefficient pattern were used, whilst impacted third molars had already begun to appear in Cleopatra's time. Among the pre-Columbian Indians bone diseases were common, as also was trephining, whilst *Datura* was used as an analgesic for operations. Abscesses were drained by suction through a reed tube, and bark corsets were used for spinal lesions. The ancient Peruvians were well acquainted with espundia (S. American leishmaniasis), trephining reached a considerable degree of skill and achondroplasia and possibly syphilis were known.

Dr. E. W. Berry, Paleo-botanist at John Hopkins University contributes a chapter on pathological conditions among fossil plants. Dr. Moodie's remarkable book will be of great interest to a wide circle of readers; it represents the first authoritative exposition of a new and important branch of medical science, and we trust that it will receive the recognition which so careful and so lavishly illustrated a text-book deserves.

THE INDIAN MEDICAL YEAR, 1923.*

A SURVEY of the papers published during 1923 by medical workers in India goes to shew how thoroughly individualistic is medical work in this country; and how correspondingly difficult to analyse for review. Further, whilst adopting a general division into medicine, surgery and hygiene, these subjects so overlap that differential treatment of any subject under these three sections is often impossible.

*Unless otherwise stated, the commissioned officers referred to are officers of the Indian Medical Service.

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MEDICINE.

Malaria.—As our columns shew, the question of the number of species of malarial parasites is still a matter for further investigation and study. With regard to diagnosis, R. B. Lal shews that the aldehdye test, if applied with the technique advocated by Napier, is never positive in malaria. Majors Knowles and Acton, and B. M. Das Gupta shew that spleen puncture is of no value as a diagnostic measure in malaria; the spleen is the grave of the malaria parasites, rather than their site of multiplication; and relapses can be explained on purely mathematical grounds by a continuance of the multiplicative schizogony cycle at a level below the febrile threshold. Major J. J. A. Brachio, I.M.D., advocates 10 minims of tincture of iodine orally three times daily by way of treatment. Major J. A. Sinton considers the malarial rigor as an anaphylactoid phenomenon and advocates the combined use of alkalies and quinine. His alkaline mixture consists of sodium bicarbonate 10 grains, sodium citrate 10 grains, to the ounce of water; whilst the quinine mixture contains 10 grains of quinine sulphate, 30 of citric acid, and 60 of magnesium sulphate to the ounce. The diagnosis of malaria having been proved, 3 grains of calomel are given; three doses of the alkaline mixture at 2 hourly intervals, followed half an hour after the last dose by one ounce of the quinine mixture. In the evening a dose of alkaline mixture is given, followed by the quinine mixture half an hour later. Under this line of treatment, with 180 grains of quinine given in 7 days, he claims a large percentage of cures without relapse.

The publication of Sir Ronald Ross' memoirs adds a classic to the literature and verifies in full his claims to "the great discovery." Lt. Col. C. A. Gill contributes two papers dealing with the important subject of forecasting malarial epidemics. In August 1921, a forecast for malaria in the Punjab for October-November of the same year was made; based upon such factors as rainfall, economic conditions and the price of foodstuffs, and the previous presence or absence of malaria in certain areas. In general the outcome verified the forecast. The same procedure was adopted in 1922; and foretold the absence of any severe or general epidemic, but probably local epidemic foci in Ambala district, in the riverine areas of the Sutlej, Beas and Ghaggur, and a moderately severe local epidemic, without increase in mortality, in Kangra district. All forecasts proved true, except that the figures for Kangra have not yet come in, but it is known that there was no appreciable increase in mortality there It is obvious that the forecasting of malarial epidemics, —now possible in India thanks to the work of many different investigators,—means that if the proposed epidemiological units can only be furnished for the country, they could be assembled together in anticipation of any epidemic outbreak, and a great saving of lives effected.

Colonel Gill also contributes an interesting paper on the subject of hill station malaria. At Murree, during the season, *A. willmori* is present in some numbers, and it was experimentally infected during July and August and transmitted experimental malaria to volunteers. Further, imported gametocyte carriers are present, and a large proportion of the resident population are non-immunes. Why, then, is malaria not prevalent? The author considers that indigenous malaria *does* occur in Murree; that for two months or so of the year both temperature and other conditions are favourable for transmission; but that the humidity in July and August is unfavourable. The question of protecting summer visitors, and especially children by mosquito nets arises.

With regard to blackwater fever, A. N. Ghore comments on its frequency in Dinajpur, and considers it to be a manifestation of severe sub-tertian malaria. He proves the courage of his convictions by treating cases with intravenous quinine.

Kala-Azar.—During the year the subject of kala-azar has received a considerable amount of attention in both the lay and medical papers; the former dealing mainly with the "alarming" extension of the ravages of the disease in Bengal and Assam, and the organisation of relief by the formation of treatment centres. Between 40 and 50 papers have been published during the year in the medical press on this subject, contributed by workers in India. No dramatic advance towards the solution of the problem of the transmission of the disease has been made, but much work has been done on the subject. With regard to treatment certain decided advances can be claimed.

Our knowledge of the epidemiology of the disease has been added to by Lt.-Col. T. C. McCombie Young's study of the seasonal incidence on onset of the disease in Assam; by Major R. Knowles, Dr. L. E. Napier and B. M. Das Gupta's study of the interesting distribution of the disease in Calcutta city; and by the work of Major J. Cunningham and Dr. P. S. Varadarajan in Madras and the surrounding districts.

A considerable volume of work on experimental kala-azar in animals has been reported. Out of 77 animals inoculated in Calcutta,—(Knowles, Napier and Das Gupta)—with spleen material, only seven contracted the infection,—2 puppies, 4 monkeys and a white mouse, —and even these shewed only a transitory infection devoid of symptoms. In Shillong, Major H. E. Shortt had a much higher percentage of successes, and produced infection in 10 out of 13 monkeys inoculated, whilst two of them shewed symptoms of acute kala-azar. He failed to transmit the disease to animals by feeding them on the supposedly infected excreta of kala-azar cases, but the Calcutta workers appear to have successfully transmitted acute kala-azar to a monkey by giving it large feeds of infected spleen material.

In a series of over 50 carefully conducted experiments, Major Shortt failed to infect vertebrates with insect flagellates, but he infected a bed bug with *H. ctenocephali*, and was able to produce "thick-tails" at will. Lt. Col. J. W. Cornwall expresses the opinion that Lt. Col. R. Row's "resistant forms" in drying cultures are really only degeneration forms.

Major Shortt grew leishmania flagellates from the urine of four kala-azar cases, but Dr. Napier and Das Gupta, working in Calcutta, failed to do this unless blood from the patient was added to the urine.

Dr. P. R. Awati, in a limited survey of the biting insects of Assam, found that *Conorhinus* was present only in infected villages, but the evidence in favour of transmission by this insect has not been further strengthened. The work of Major Shortt and of Major Knowles, Dr. Napier and Das Gupta tends to still further discredit the bed bug transmission hypothesis. The former worker also gives an interesting study of the pathology of acute kala-azar in monkeys, shewing that the endothelial cells are mainly affected. Dr. M. N. De reported a case of noma of the cervix uteri in an afebrile and fatal case of kala-azar, and Dr. D. N. Bannerji a case in which ulcers in the stomach wall shewed leishmania.

Drs. D. N. Bannerji and I. C. Saha found that the blood sugar was always reduced in kala-azar, and in one case they reported reduction to the very remarkable figure of 0.031 per cent. Dr. U. N. Brahmachari's case of dermal leishmanoid of 1922 was reported in two further medical journals in 1923.

Little advance is reported in diagnostic methods, but Dr. Brahmachari has further elaborated his globulin test and Dr. Napier has reported his further experience with the aldehyde test and spleen puncture findings. He finds that about 90 per cent. of kala-azar cases shew *L. donovani* at the first spleen puncture, and that the aldehyde test first becomes positive about the fourth month of disease, and further, that a strongly positive reaction can be taken as absolutely diagnostic.

The classification of the antimony salts and compounds, with notes on their pharmacological properties and therapeutic values, was given in a paper by Major

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R. N. Chopra and Dr. Napier. Dr. Brahmachari gave further reports of his extensive researches on the toxic effects of both single doses and repeated doses of numerous antimony compounds, and also describes a number of new compounds. He also gives a summary of his researches on the question of the excretion of antimony, with details of methods for detecting small quantities in the urine and fæces.

Reports on the treatment of kala-azar with the antimony tartrates have been published by Lt.-Col. F. P. Mackie, Major J. Cunningham, Dr. Dodds Price, Major Shortt and other workers. The consensus of opinion is that the two grammes which had been adopted by some previous workers is too low, and that the majority of cases require more than this total dosage, whilst there are some which are absolutely resistant to treatment with the antimony tartrates.

Considerable advance in treatment has been made by the introduction by Dr. Brahmachari of the so-called "urea-stibamine," which has now had a fairly extensive trial and is reported on very favourably by himself, and by Major Shortt and R. T. Sen. It is claimed that patients can be completely cured by the injection of two grammes in 20 days. In our last issue a similar or even stronger claim is made by Dr. Napier for the new preparation, "von Heyden 471", (meta-chlor-para-acetyl-amino-phenyl stibiate of sodium), but his experience has so far been limited to 11 cases. Further trials with this compound are awaited with interest, as it is claimed to be a definite chemical compound, and therefore probably more stable than "urea-stibamine." If the use of salts of pentavalent antimony, first introduced and insisted on by Dr. Brahmachari, is going to reduce the period under treatment from three months to three weeks, with an equal measure of success, a notable advance will have been made.

The complete failure of "Bayer 205" in the treatment of kala-azar is reported by Dr. Napier, who, in another paper reports unfavourable results with "stibenyl" in ten cases.

The publication in 1923 by Drs. Napier and Muir of their "Handbook on Kala-azar" places in the hands of practitioners in India at a low price the whole essentials of knowledge with reference to the disease, and consolidates the present position,—only, we hope, as a preliminary to a further advance.

With regard to *Plague* the subject of transmission continues to receive the closest of attention. Major F. W. Cragg, continuing his former studies, examined 6,318 rat fleas from the Punjab and U. P. The prevalence of *X. cheopis* and of plague shewed a general correlation, in some areas a very close correlation. With the help of Mr. C. S. Swaminath he has studied the bionomics of *X. astia*, and shews that few of these rat fleas survive for more than 24 hours after death of their rat host; further, that they will feed on man only with reluctance. Dr. Fabian Hirst has studied the problem in Colombo. *X. cheopis* predominates and is the more efficient vector. Further, *X. astia* never behaves as a blocked flea, with the proventriculus blocked by a solid culture of *B. pestis*. Attempted transmission experiments to rats with *X. astia* were all negative, whilst it was the most prevalent rat flea in the non-plague areas as against *X. cheopis*, which prevails in the plague areas.

Major J. Taylor and Dr. G. D. Chitre, on the other hand, are less certain of the role of *X. astia*. Experimentally they shew that *astia* will convey plague to rats and guinea-pigs; further it will bite man,—with reluctance,—at temperatures of 76 to 84°F., 72 per cent. of successful bites being recorded. The bionomics of *astia* require further study, but apparently climatic conditions suitable for *astia* prevalence are unsuitable for *cheopis*.

Dr. G. S. Sahsrabuddhé, writing from Poona, very strongly advocates the use of Yersin's serum intravenously. It acts "almost like the neutralisation of an acid by an alkali," causing a temporary drop of the temperature to normal, and a steadier pulse. Major C. J. Stocker has produced a sensitised anti-plague vaccine for the treatment of cases, and records the treatment of 19 cases at Peshawar with only one death. He is ready to provide this vaccine for the treatment of cases, on condition that the recipients report the results in detail. G. A. S. Chawla draws attention to œdema of the leg following plague after excision of the buboes, a condition obviously due to lymphatic stasis.

With regard to *Deficiency Diseases*, Lt.-Col. R. McCarrison has continued his enquiry. He draws attention to adrenal hypertrophy in inanition and avitaminosis, apparently correlated with a condition of acidosis,—an emergency effort on the part of the body to compensate for respiratory disturbances, oxygen want, and falling temperature. The epinephrine functions seem to be dependent upon the activity of the oxidative processes in the body, are stimulated by cold and depressed by heat, whilst the glands adapt themselves to changes in oxidation and pH reaction by regulating the adrenalin output. Excess of fats in the food of pigeons, plus defective iodine absorption or metabolism, may enhance goitrous states, and there is a distinct relationship between the thyroid and the fat metabolism of the body. Cod liver oil protects completely against goitre due to insanitary surroundings. Ophthalmia occurs in pigeons fed exclusively on a diet of parboiled rice, but can be prevented by the addition of soil to the food. Apparently the condition here present is that the amount of vitamine B present is only just sufficient to maintain life at a low ebb, whilst the deficiency in vitamine A produces its effect in the characteristic ophthalmia. An analogy is drawn to conditions in Tanjore, where ophthalmia is prevalent, but beriberi is rare; whilst the Tanjore rice causes similar ophthalmia in experimental pigeons.

The same author has also studied the epithelioma contagiosum of fowls, which occurred in a batch of pigeons, fed on washed, milled rice, and suffering from polyneuritis columbarum. He attributes the disease to an invisible virus, acting on birds suffering from vitamine deficiency, endocrine disorder and abnormal metabolism.

Lt. Col. J. W. D. Megaw and Dr. R. N. Bannerji discuss the problems of *beriberi and epidemic dropsy*. Two localised outbreaks of the latter disease at Allahabad are detailed. In both cases the evidence incriminates infected rice, but is not conclusive.

Lt. Col. Megaw deals with the question in greater detail in later articles: polished rice differs from unpolished in other factors as well as in vitamine content; in fats, phosphorus and proteid content. Also it is less stable and more liable to deterioration. Avian polyneuritis differs in many particulars from beriberi as seen in man, and may not be the same disease. The beriberi and epidemic dropsy group of diseases appear to overlap, but are practically confined to eaters of parboiled and milled rice. Deficiency of vitamine B probably aggravates, rather than causes these diseases. There may be a human disease due to deficiency of vitamine B, if so the symptoms probably are those of multiple neuritis and cardiac depression, whereas cardiac excitation is probably a constant feature of beriberi and epidemic dropsy. A review is given of the measures suggested for rice control and for the need for a well balanced diet; a combination of these can be relied on to prevent the disease; reliance on the vitamine deficiency view alone is unsafe.

Major G. G. Jolly comments on the use of germinated pulses and beans in the natural dietaries of Burmans and advocates their introduction into the dietaries of police forces and jail prisoners. Dr. J. L. Das finds the dietaries of Indian schoolboys in Bihar and Orissa sufficient in carbohydrate and calorific values, but largely deficient in proteins, fats and vitamines; he outlines a sufficient and balanced diet at a cost of Rs. 10 p.m. With regard to *lathyrism* A. Howard, J. L. Simonsen and Major L. A. P. Anderson consider that the toxic element responsible resides in a weed, *Vicia sativa*, in

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the form of either an alkaloidal base, vicine, or its hydrolytic product, divicine.

In regard to *Dysentery* Majors H. W. Acton, T. C. Boyd and R. N. Chopra contribute a paper analysing the toxins of the Shiga bacillus and the environments necessary for their production,—a subject already reviewed last year. Capt. G. C. Maitra finds that the dysentery in the Jharia coalfields is mostly bacillary, and that Flexner infections predominate over Shiga infections. He draws attention to hookworm infestation as a secondary ætiological factor in the production of bacillary dysentery. Major Knowles, Drs. Napier and B. M. Das Gupta analyse the pH findings in infections with *E. histolytica* in a preliminary communication, shewing that this parasite is in its most active and destructive phase at a pH on the acid side at about 6.2; and that this may have some bearing upon both the prognosis and treatment of amœbic infections and upon the proposed cultivation of the parasite on artificial media. Major J. Cunningham, on an analysis of jail dysentery, shews that 86.5 per cent. of cases were bacillary, 7.7 per cent. amœbic, and 5.7 per cent. mixed. He divides cases into acute, sub-acute and chronic. The latter infection was first described by Norman Chevers in 1886 under the name *morbus bengalensis*, and may present but few clinical features of dysentery, the patients dying either in a state of acute emaciation or with ascites and œdema. He especially advocates macroscopic examination of the stools for mucus as an easy and reliable test for the detection of latent dysentery, and shews that if this test be applied and such patients as still shew mucus be segregated, epidemic conditions may be readily controlled. Major J. A. Sinton records the symptomless infection of a Pathan prisoner eleven years in Lahore Central Jail with *Balantidium coli*, an infection which could not possibly have been picked up from association with pigs. On the other hand Dr. G. C. Ramsay in Assam records the relative frequency of this parasite in the intestine of pigs and sheep in tea garden coolie lines in Assam, and regards balantidial dysentery as probably not uncommon in India.

Cholera is ever of importance in India. Dr. J. W. Tomb in his report for 1921-22 dwells upon this disease as being the most important problem of the mining areas of India. Whether the infection is endemic or imported, *e.g.*, from such religious festival centres as Puri, remains to be determined. Of 1,200 cases treated the case mortality was 48 per cent., and the general incidence 3.64 per mille of the local population. Contamination of water supplies by washing of infected clothes, and the contraction of the disease by contacts are the chief factors in its spread. He especially advocates the use of a mixture containing volatile oils by way of both prophylaxis and treatment (Spir. ætheris 30 minims; oils of cloves, cajeput, and juniper equal parts to 5 minims; aromatic sulphuric acid 15 minims; dose one drachm in half an ounce of water every half hour until vomiting and purging cease; for contacts one dose once or twice daily). By the routine use of this mixture for contacts he claims a nearly 50 per cent. reduction in cases. Dr. S. K. Dastidar draws attention to the state of vasomotor instability in cholera and to the alarming sequelæ sometimes met with after intravenous injections of hypertonic saline; whilst Dr. S. M. Lall from Bulandshahr draws attention to acute and often fatal attacks of gastro-enteritis of streptococcal origin—often fly borne,—simulating true cholera.

The same author also records an interesting case of heavy infestation with *Fasciolepsis buski*, hundreds of worms being passed after the administration of Manson's eucalyptus and chloroform mixture. The Rev. Father J. F. Caius and Dr. K. S. Mhaskar record the results of an investigation into ascaricides. Seven derivatives of santonin were tested. Their anthelmintic properties apparently reside in the—CO-CH$_2$—group, and not in the lactone group. In connection with *Helminthology* in general Dr. N. Annandale contributes a review of the species of the genera *Bullinus* and *Physa* found in India, whilst Capt. S. D. S. Greval comments on schistosomiasis in Arabia. Four cases were seen in seven months; 2 of *S. hæmatobium* infection, and 2 of *S. mansoni*.

With regard to *filariasis*, Majors J. A. Cruickshank and J. Cunningham discuss the findings in elephantiasis, shewing that non-elephantoid persons in the endemic areas shew a greater percentage of positive microfilaria findings than do cases of elephantiasis. Only 8.3 per cent. of elephantiasis cases and 52 per cent. of cases of symptomatic filarial disease in the endemic areas gave positive microfilaria findings. Age incidence is maximal for the infection at from 20 to 40 years of age. Their findings for S. India are entirely at variance with those of Professor Stephens for Fiji. Dr. Sunder Rao shews that the three conditions necessary for filarial endemicity are (a) the importation of the infection in a human carrier, (b) the carrying mosquito species present, and (c) a certain range of temperature and humidity, such as is usually associated with a low lying and water-logged locality or a coastal belt. The relationship of the very common filarias of birds and animals to those of man demands investigation. Dr. S. K. Roy has traced the development of the microfilaria of *F. bancrofti* from the ovum to the pre-adult in a case of lymph scrotum; and Drs. R. N. Bannerji and B. A. Vaidya call attention to the possibility of hæmoptysis in filarial infection simulating phthisis. Lt. Col. F. F. Elwes records the entire failure of treatment by intravenous injection of tartar emetic in three cases.

In *Leprosy* the chief contributors of the year have been Dr. E. Muir, Major R. B. Lloyd, and Dr. Muir's assistants, sub-asst. surgeons E. Landeman, T. N. Roy, and I. Santra. The Wassermann reaction they find to be positive in 17 per cent. of untainted leper children; positive in 27 per cent. of adult cases of nodular leprosy and in 63 per cent. of anæsthetic cases—a mean of 42 per cent.: positive in from 47 per cent. to 100 per cent. of similarly infected leper children,—mean 62 per cent. As regards transmission, all the known facts point to inoculation into some abrasion of the skin or mucosa. The Indian Leper Act of 1898 which refers chiefly to lesions in anæsthetic cases and which is still in force, is antiquated, and the 1920 amendment has still to become law. The nodular type is far more infective than is the anæsthetic, ulcerative type. Lepra bacilli do *not* multiply rapidly during phases of inflammatory reaction. The best line to be pursued for eradication of the disease would appear to be the opening of local dispensaries for treatment and for the propagation of accurate knowledge with reference to the disease. In a profusely illustrated article. Dr. Muir shews how leprosy spreads throughout the body, the bacilli multiplying in the lymph channels, being set free by the breaking down or softening of the gelatinous matrix in which they lie, and thence disseminated via the lymph stream or via the blood. The muscular and bone changes appear to be the indirect results of the pressure of fibrous tissue. Anæsthetic lesions appear to increase in a mixed case whilst cutaneous lesions are in retrogression, and vice versa. As regards treatment, no claim to a specific cure can as yet be substantiated. The secondary factors are of great importance; attendance to exercise, diet, constipation, and the hygiene of the skin by baths, friction and systematic rubbings with chaulmoogra and other oils; also to such factors as concomitant syphilis, ankylostomiasis —where an examination of 509 leper patients revealed a 91 per cent. infestation,—and influenza. The improvement to be expected in any individual case varies very greatly. Some patients will take 6 to 7 c.c. injections of the ethyl esters of chaulmoogra and similar oils without symptoms, others react violently to doses of 1 c.c. Local infiltration of leprous lesions from the four poles of the lesions with a mixture of hydnocarpus esters 1 c.c., olive oil 3½ c.c., creasote ½ c.c., camphor ½ gramme, with doses rising to 4 c.c. has given good results. It is also suitable for anæsthetic patches. In general it may be

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said that each case of leprosy is a different individual for study, and that each must be investigated upon its merits and especially upon its reaction to treatment. Even the vaccine prepared from Kedrowsky's bacillus—(an acid-fast organism supposed to be at least related to the lepra bacillus),—may be of use; but what should be aimed at is distinct but controlled reactions to injection. In other words routine injections can never succeed.

With regard to the *enteric fevers*, Lt.-Col. J. W. Cornwall raises the important issue of the possibility of latent typhosus infection in man; a rabbit died from other causes 35 weeks after it had received an intravenous injection of living typhoid bacilli, and *B. typhosus* was recovered from its bile, jejunum, liver and spleen. Does anything of the same sort, with the possibility of typhoid fever developing many weeks or months after the date of first infection occur in man? Capt. G. Shanks and G. P. Khan draw attention to *non-motile* strains of *B. typhosus*, and the fact that many cases of typhoid will shew agglutination to such strains when they will not agglutinate with a motile strain. The former author, using Dreyer's technique in France during the war, shews that this technique can be depended on to give a positive diagnosis when enteric fever occurs in an inoculated person. A change of from 100 to 200 per cent. in the maximal titre of agglutination, setting in as a regular curve, and reaching a maximum between the 16th and 24th day of fever justifies a diagnosis of enteric fever in an inoculated person. Lt. Col. F. A. F. Barnardo advances new and unorthodox views with regard to typhoid fever; the symptoms preceding hæmorrhage are a transitory fall in temperature, great acceleration in the pulse rate, marked polyuria and a sudden rise of blood pressure. Relapses are often due to secondary invasion of the blood by septic cocci, such cocci having been isolated in 72 out of 180 cases of relapse. In treatment the temperature must never be allowed to rise above 102.5°F., tincture ferri perchloride should be given in very large doses, proteins withheld, and calcium administered cautiously.

Typhus has been the subject of a short study by Major E. S. Phipson, in connection with an outbreak of 16 cases at Simla, the infection having been imported with vegetable sellers from an independent state 25 miles away. Twelve of the cases gave a markedly positive Weil Felix reaction at titres up to 1 in 2048. The Weil Felix reaction is not only useful in the diagnosis of cases; it is also useful with respect to retrospective diagnosis and persists well into convalescence.

In connection with *diabetes* the chief event of the year has been the liberation of insulin for sale. Major A. H. Proctor's striking case of an Englishwoman almost moribund from diabetic coma resuscitated after 60 units given empirically during 12 hours shews that some at least of the insulin on the Indian market retains its full potency. On the other hand the article by Major J. Taylor and Dr. A. J. R. Douglas in this issue shews that much of the insulin on the Indian market has lost its efficacy, and that the conditions of sale and storage require looking into. It is rather characteristic of matters in India that, whereas in England the insulin supplies were carefully tested and at first only issued under most careful supervision, one of the first persons out here to secure supplies should be a local photographer in Rangoon. Dr. J. P. Bose shews the value of the study of glucose tolerance tests in differentiating glycosuria from true diabetes mellitus: curves of quite different and characteristic types are obtained in such conditions as hyperthyroidism, hyperpituitarism and hypopituitarism, whilst the renal type of glycosuria stands out clearly as a separate entity. His earlier supplies of insulin, (Lilly and Co.), obtained partly direct from Home and partly on the Calcutta market, were fully efficacious. Capt. J. C. De records a case of orbital neuralgia and ocular paralysis where these symptoms were the first indications of a glycosuric state.

Diphtheria, as an Indian disease, chiefly affects boarding schools in hill stations. Major E. S. Phipson deals with an outbreak at Bishop Cotton's School, Simla. An imported case having occurred with the opening of the summer session, 12 further cases followed. Staff, boys and menials were examined,—200 in all. 36 were carriers. Yet, despite the usual measures of segregation, etc., the infection hung on, and the more thorough the examination the greater the proportion of carriers found, and the longer the persistence of the carrier state. He asks how such a state of affairs can be remedied. The answer is supplied in the paper by Lieut. E. C. R. Fox, I. M. D., Major E. J. C. McDonald and Lt. Col. T. C. McCombie Young. Diphtheria having proved a positive curse in the schools at Shillong from 1917 to 1921, a determined effort to grasp with the situation was made. Toxin-antitoxin supplies were got, in the first instance from America, and these proved to be inert; in the second instance from the Wellcome Research laboratories, which proved to be active. 271 children were tested by the Schick test, of whom 125 or 46 per cent. were found to react. At St. Edmund's of 143 boys tested, 57 gave a positive Schick reaction, 56 of them were immunised, and the 57th, whose parents refused to have him immunised, contracted diphtheria. The Shillong schools have now been cleared of the infection for the first time in six years. A. C. Vardon, on examining the general mixed Indian population at the Pasteur Institute, Kasauli, found 5 per cent. to be harbouring diphtheria bacilli, or at least bacteria morphologically indistinguishable from the Kloebs-Loeffler organism, and one-seventh of the strains isolated were virulent to guinea-pigs. The percentage both of carriers and of virulent strains was higher in those with pathological than in those with normal throats. It is essential to take both nasal and throat swabs from each person.

Framboesia is now an additional medical problem for Assam. Dr. A. Powell in a long and interesting address before the Royal Society of Tropical Medicine records what he believes to have been the first introduction of the disease into India as having occurred in 1899. A coolie woman with an infected daughter came from Ceylon to Konapara in 1887; and by 1901 there were 256 cases on the garden, from which the disease spread into adjacent gardens and districts. His historical account is followed by an excellent clinical account of the disease illustrated by very clear photographs, analysing the stages of the primary yaw, the general eruption, auto-inoculation and tertiary yaws. Gangosa he believes to be tertiary syphilis rather than yaws. The publication of Dr. R. L. Spittel's little handbook on framboesia tropica is also an event of the year, and in it he very clearly lays down the differential diagnosis from syphilis and the lines of treatment to be adopted. Major R. Knowles, Major R. N. Chopra, J. C. Gupta and B. M. Das Gupta give notes on 12 cases thoroughly studied. The best method of diagnosis is to look for *T. pertenue* in the serous exudate from a typical lesion under dark ground illumination, and this gives far more positive results than does the Wassermann reaction. But special care must be taken to get *serum*, and neither pus nor blood. Attempts at animal passage and culture failed. Sulfarsenol and silver salvarsan were found about equally efficacious in treatment, whilst the former has the advantage of being cheaper, and is feasible for subcutaneous administration. The results after subcutaneous injection were as good as those after intravenous injection. S. C. Sen notes on the prevalence of yaws in Burma, quoting an instance of five cases in a single family. He uses novarsenobillon injections, external applications of 20 grains of copper sulphate to the ounce locally, and mercury and iodides orally.

Turning to *venereal diseases* Dr. C. F. Chenoy advocates bismuth in the treatment of syphilis, and gives for preference Neotrepol in doses up to 4 c.c. intravenously. The clinical results are excellent, whilst there is less risk of toxic symptoms than with the arsenical derivatives. Dr. T. J. Doderlein deals with *gonorrhœa* in the female. Here there are several points of clinical importance. As the urethra is rarely involved and there is no painful micturition, acute gonorhœa in the female is rarely seen

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in hospital. Most cases by the time they come into hospital have become converted by injudicious douching into chronic gonorrhœa with cervicitis. He advocates excision of Bartholin's glands, amputation of pseudo-hypertrophied cervices, and in general a permanganate douche, followed by local application to the cervix of 25 to 50 per cent. zinc chloride and an iodoform gauze pack.

Major W. L. Harnett deals with the very important criteria for cure of gonorrhœa in the male. Cultural examination is useless, and the absence of gleet and of threads in the urine is no guarantee of cure. He advocates first examining the anterior urethra with the urethroscope. The bladder is next filled with 1 in 2,000 mercury oxycyanide, and the prostate and seminal vesicles massaged. Films of the discharge are made and stained and the total number of leucocytes in 20 or 30 microscope fields recorded, as an average per field. If the count is only one or two per field and no gonococci are found, the case is probably cured. To ensure this the test is repeated after three days' use of alcohol. Of 88 cases treated in an Indian war hospital at Constantinople 64 reached this standard of cure, and none relapsed.

Capt. A. P. Pillay analyses the results of cases of gonorrhœa treated by different methods but lays down no hard and fast line of treatment as the best; chronic gonorrhœa in the male, as well as in the female, is one of the most difficult problems in therapy.

Turning to *tuberculosis* the usually accepted view that Indian cattle are free from infection is now less firmly held than it was. Mr. M. H. Sowerby, L.C.V.D., records the case of a cow in the Bombay presidency found heavily infected, and refers to findings by Taylor in 1915-1917 of 3½ per cent. of cattle slaughtered at Ferozepore infected. In treatment Major J. L. Sen advocates E. C. C. O. for tubercular adenitis, and Lt.-Col. F. F. Elwes summarises the present position of sodium morrhuate therapy. The drug is of considerable value in increasing the weight of patients and making them generally fitter; it is a most useful therapeutic agent, but it is far from being a cure for phthisis. Of other lines of treatment *intravenous iodine* is advocated by Lt. Col. W. W. Jeudwine, who presents the whole case for this mode of therapy on a large statistical basis. The doses used are from 1 to 2 c.c. of the tincture, preceeded and followed by saline irrigation of the vein in order to avoid thrombosis, and diluted to 10 to 20 c.c. with saline. The injections are sometimes followed by a rigor, and a high and persistent leucocytosis follows. In all septic states such as boils and carbuncles the treatment is apparently very good, but its greatest value of all, he claims, is in "septic lung" (bronchitis and bronchiectasis), and it is of value in early and second stage phthisis. He pleads at least for a further and extensive study of the method.

Of other advocates of intravenous iodine therapy N. K. Menon records its use in chronic arthritis and in a case of abscess in Douglas' pouch; Dr. A. K. Mitra uses 5 to 10 minims diluted with water in gonorrhœal arthritis, carbuncles, whitlows and septic lesions; P. B. Mukherjee records its use in two cases of septic dog bite; and Dr. K. Daleppa advocates it for tubercular adenitis. The whole question of the real value and indications for intravenous iodine demand further study however.

Dengue.—Lt. Col. J. W. D. Megaw attacks the position of those who hold dengue and sand-fly fevers to be clinically distinguishable diseases, pointing out that cases occurring in a dengue outbreak may present temperature charts and symptoms typical of sand-fly fever, and *vice versa*. He would prefer to classify provisionally both diseases as dengue until the virus has been worked out and to refer to them as mosquito-dengue and sandfly-dengue respectively. He discusses the relationship between these fevers and those described by Whittingham and Couvy in which a spirochæte was found, Whittingham calls the fever sand-fly fever, while Couvy calls it dengue, yet the fevers appear to be identical. In the article by Megaw a curious clerical error occurs, the name of Ledingham being substituted for that of Whittingham in two or three places.

The differences between Japanese seven day fever and Rogers' seven day fever or seven day dengue are pointed out. Stress is laid on the duration of the disease cycle in the fevers which show a tendency to relapse, dengue, infective jaundice, relapsing fever and rat bite fever being included in this group.

Capt. C. J. Stocker records an interesting piece of work in connection with an outbreak of "seven-day fever" in the 79th Carnatic Infantry at Rangoon. In blood culture a bacillus with reactions resembling those of *B. fæcalis alkaligenes* was isolated in 6 out of 27 cultures, the growth, however, being scanty in broth, even at 48 hours. Cultures from 9 out of 24 locally caught culex gave a similar organism. It will be remembered that Sir Leonard Rogers cultivated an organism of the coli group from some cases of seven day fever. The blood picture shewed eosinophilia at the 5th to 9th day of disease.

Dengue has swept India, as far as we can ascertain, in 1923, all the Presidency cities having suffered severely from the disease, which has been of a particularly virulent type. That the aetiology of the disease is not yet established is clear. It would appear that there is undoubtedly a type of fever lasting about seven days due to *B. fæcalis alkaligenes* infection in the blood stream—(it was seen in Mesopotamia during the war, as well as by Captain Stocker in Rangoon)—but whether this is or is not identical with true dengue is a moot point; probably not.

Relapsing fever has been recorded from Madras for apparently the first time for nearly a century; whilst Dr. M. J. Permanand contributes an interesting clinical account of four cases of *rat bite fever* from Bombay. Temperature charts of infected guinea-pigs are given, whilst it is important to note that,—as is most unusual with spirochætes,—*S. morans-muris* is more readily detected by examination of stained blood films than by dark ground examination. The white mouse is, par excellence, *the* experimental animal in which to maintain strains of the virus.

Major E. S. Phipson analyses the great *influenza* pandemic of 1918 with special reference to Bombay in an able and most interesting article; shewing how clearly the two-wave phases were seen in Bombay and the high mortality associated with the latter wave. He also comments on the energetic way in which local and Indian volunteer aid came to the rescue and on the fine work done. Major H. W. Acton discusses the causation and treatment of *asthma*, a disease of special importance in Bengal. He traces bronchial spasm to poisonous amines, and shews that it can be experimentally produced by such bases as histamine and arecoline. Three factors are concerned; the poisonous bases which cause constriction of the bronchial musculature and turgescence of the bronchial mucosa; the defensive mechanism of the body, which largely resides in the capacity of the liver to neutralise such poisonous bases before they can reach the lung; and the tonus of the nerves concerned. Of extrinsic causes we have the volatile emanations from animals, pollens, etc. Of intrinsic causes we have respiratory tract bacterial infections which lead to the production of poisonous amines, intestinal factors leading to a similar result, and certain foodstuffs. The defensive mechanism consists of an eosinophilia, a hydrogen ion concentration unsuitable for the action of these poisonous amines, and the liver "barrage." Finally endocrine activity governing the activities of the sympathetic nervous system. Asthmatics may be grouped into vagotonics, those with sympathetic predominance, and a mixed group of both. Hence treatment is a question of analysing the causes and conditions present in each individual case and dealing with them. N. C. Ghose records a case of asthma in a boy apparently due to peripheral (nasal) irritation.

As regards *small-pox* Dr. N. H. Chosky contributes an article to a correspondence in the *B. M. J.* on the differential diagnosis between small-pox and chicken-pox,

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based upon his many years' experience at the Arthur Road Infectious Diseases' Hospital in Bombay. If the type of eruption and vesiculation be carefully studied, he points out, mistakes are almost impossible.

Chicken-pox may be quite a severe disease in some cases. Major J. J. A. Brachio, I. M. D., advocates 10 minims of tincture of iodine orally three times a day and also the external application of the same.

Snake-bite.—The publication of Colonel F. Wall's book on "How to identify the snakes of India, Burma and Ceylon" will be welcomed by civil surgeons. Beli Ram records two fatal cases from Garhwal. Two brothers were sleeping on the floor of a house together. One was wakened at 3 a.m. by what he thought was an insect bite, and dropped off to sleep again. At 6 a.m., on waking, he discovered a snake in the room, and ran to hospital. Typical symptoms of colubrine intoxication set in, and, despite the intravenous administration of 80 c.c. of fresh antivenene, death occurred in some nine hours. The younger brother who had slept with him did not even know that he had been bitten, but developed the same train of symptoms and died some hours later. It is concluded that the cases were due to krait bite. The Rev. Father J. F. Caius and Capt. K. R. K. Iyengar have been trying for two years to concentrate the standard Kasauli antivenene. They conclude that the immunity principle resides in the "antivenene-proteid aggregate"—(it was shewn years ago by Acton and Knowles that it resides in the globulin fraction)—and shew that by desiccation in vacuo the antivenene can be concentrated to twice its original potency,—a concentration, however, which still leaves the serum too weak for practical purposes. They further advocate the dilution of the present serum with an equal part of saline or water before injection, when the action seems to be somewhat reinforced and the risk of anaphylaxis lessened. This most important problem in Indian medicine, however, to-day remains still unsolved,—although not, we believe, insoluble.

Skin Diseases.—The special skin out-patient clinic at the Calcutta School of Tropical Medicine is becoming more and more widely known. Here we have the beginnings of a systematic and organised research of very considerable importance in Indian medicine, orderly classification, and new light thrown upon old problems. The paper by Major H. W. Acton and Dr. Ganpati Panja on leucoderma is an instance. True *leucoderma* should of course be carefully differentiated from the pseudo-leucodermas of leprosy, syphilis, etc. Melanin is produced by the melanoblasts by action of a ferment, tyrosinase, from a mother substance which is probably an amino-acid of the aromatic series. Given a deficiency in the supply of this mother substance, and however active the melanoblasts, leucoderma will ensue. On an analysis of 100 cases seen, the age distribution ranged from 4 to 52 years, and local irritation often seems to play a part in determining the onset. The affected skin is normal, except for the pigmentary defect. Clinically the disease always starts with a herald spot,—78 cases. Four types can be distinguished; the melung type with symmetrical distribution on the limbs; the *dhoti* type, especially affecting the iliac crests; the muco-cutaneous type, affecting the junctions of skin and mucous membranes; and the diffuse type. When the patches become inflamed we have red or inflamed leucoderma. The supply of the necessary amino-acids is partially under control of the endocrine functions and these may need investigation. Treatment is so far frankly experimental. At present the best results obtained have been from the use of *bouchi* (*Psoralia corylifolia*), the seeds being given orally, and the expressed oil as a local application.

The term *eczema* is now no longer used in this clinic. Instead every attempt is made to establish an accurate diagnosis. Many cases are cases of seborrhœic dermatitis or of streptococcal origin. Dr. U. N. Mandal, working in the clinic, analyses the streptococcal affections of the skin. The long chained strains appear to be the more virulent, and also the hæmolytic strains. Rabbits injected intravenously with these strains tend to die after a period of from 10 to 30 days, not from septicæmia so much as from chronic arthritis and diarrhœa. The lactose-fermenting property appears to go *pari passu* with lactic acid production and vesiculation.

For *Naga sore* Dr. R. B. Abraham advocates hot dressings of calx chlorimata, together with intravenous antimony tartrate. He claims that this materially reduces the period under treatment. Lt.-Col. E. C. C. Maunsell records what appears to be the first case of *mycetoma* infection met with in Coorg, and D. N. Ghosh records the first case which he has encountered in 24 years of work in the Sonthal Perganas.

Of heart diseases Dr. S. C. Bose records a case of auricular fibrillation successfully restored to normal rhythm by the administration of quinidine, after the failure of large doses of digitalis; Major R. S. Townsend records cases of sudden death due to rupture (*a*) of the cardiac muscle, and (*b*) of a small aneurism of the first part of the aorta into the pericardium; whilst K. K. Pillai records a similar case due to rupture of an aneurism of the terminal portion of the ascending aorta into the pericardium. Of *nervous system diseases* Capt. J. C. De records a case of (?) encephalitis lethargica with Parkinsonian syndrome and J. W. McK. Nicholl one of progressive muscular dystrophy. In the field of *mental diseases* Major O. A. R. Berkeley Hill submits a plea for a mental hygiene movement in India, similar to those in Great Britain and in the United States, and contributes an edifying analysis of the ætiology of the psycopathic child; parents of such children he would classify into those who tyrannise over their children and those who allow their children to tyranise over them. In treatment of mental cases he relies above all else on carefully arranged and suitable occupational therapy supplemented by hydrotherapy and amusements. The hospitalisation of asylums in India having been secured, there are several other reforms which he urgently desires; the abolition of the barbarous custom of keeping suspected insanes in jails for observation, the sending of female European patients to Ranchi without an accompanying European nurse, the introduction of special mental nursing sisters, trained for these special duties, and the revision of the conditions under which European insanes are transferred to the United Kingdom. The parole system at Ranchi is yielding excellent results; the patients are provided with concerts, dances and a brass band and he now requires a cinema, which we are sure that he will get.

In *carcinoma* Dr. S. Mallanah advocates treatment by injections of tumour antigen, obtained by emulsifying alcohol-dried extracts of tumour in saline. Lt.-Col. T. C. Vaughan (retd.), gives a review of the first six months' working of the Radium Institute at Ranchi. The results in benign tumours have been excellent, but the Indian patient with carcinoma arrives at the last phase and usually desires to leave immediately improvement is noticed. Good results are recorded in uterine fibromata and carcinoma of the breast. Continuing his series of observations that secondary nodules at too considerable a distance from the primary lesions to be affected by direct radiation often clear up in the most surprising manner, he is now trying treatment by injections of the patient's own blood, removed into citrate-saline and irradiated at body temperature. The growth of the X-ray department at Madras under the highly skilled direction of Capt. T. W. Barnard (late R. A. M. C., and formerly radiologist to the London Hospital) is shewn in an increase from 2,531 examination in 1919 to 11,757 in 1922.

Of many miscellaneous matters we may select the advocacy by Raja Ram of local injections of 10 to 15 minims of a solution of sodium salicylate, 15 grains to 15 c.c., locally in acute rheumatism; and by D. M. Vasavada of sodium salicylate plus sodium iodide intravenously in the same disease. Capt. A. P. Pillay's interesting analysis of methods of malingering in the Indian Army, and his case of sudden blindness supervening in an Indian female aged 60 six days before the onset of

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fatal apoplexy. Capt. A. F. W. da Costa, I.M.D.'s case of infantile biliary cirrhosis at Nagpur, and the publication of Dr. S. K. Mukerji's little book on the same mysterious disease: 48 cases with a 63 per cent. case mortality are analysed and a full bibliography given. The disease is one of infants of from 6 to 24 months of age and its true ætiology still demands explanation. Capt. G. Shanks's report as Professor of Pathology to the Medical College Hospitals, Calcutta, in 1922 emphasises the extreme importance in India of blood culture in all cases of pyrexia of uncertain origin; plague, typhoid, streptococcal septicæmia and other conditions were all diagnosed by this method. Major A. P. G. Lorrimer's analysis of the problems of an out-patient department in a big Indian hospital in the 1922 report of the Madras General Government Hospital, also deserves mention, since it is the first really lucid and detailed study of such problems that we have seen: whilst Major W. L. Forsyth's remarks (in the same report) on the number of Indian patients admitted to hospital in a moribund state—(20 out of 490 last year at Madras) —will arouse a sympathetic response from all workers in India in charge of both medical and surgical wards. "B. I. D.'s" in a London hospital mean a pecuniary reward for the resident on duty; in India they mean hours of wasted and unrewarded toil spent in attending the courts.

PHARMACOLOGY.

In the field of pharmacology five papers call for specific mention, apart from those already noticed. Continuing their studies of indigenous Indian drugs, Major R. N. Chopra and Drs. B. N. Ghosh and S. Ghosh have investigated the properties of *punarnava* (*Boerhaavia diffusa*), as a diuretic and cardiac stimulant. The active principle they find to be an alkaloid, punarnavine, whilst the excess of potassium salts in the plant also increases diuresis. Doses of one to two drachms of the liquid extract act as a powerful and safe diuretic. This newly introduced drug is of especial value in the ascites due to early hepatic cirrhosis and chronic peritonitis; in renal ascites and similar conditions it is of less value. The paper constitutes a model of what is wanted in the way of research work into the value, or otherwise, of indigenous Indian drugs.

Major Chopra and Dr. J. B. McVail also contribute an interesting report on the place of *carbon tetrachloride* in pharmacology and therapeutics. It is the most efficient anthelmintic known for hookworm, but is of little value for ascaris infection, and of none for tænia infection. The toxic dose, 1 to 4 c.c. per kilo. body weight, is far below the therapeutic dose, 0.13 c.c. per kilo., or a total dose of 4 c.c. for an adult. The drug is but slowly absorbed from the alimentary canal, and hence large doses may be administered. Given in medicinal doses, and followed by a purgative, it is safe; but if inhaled into the trachea, alarming symptoms may follow; hence it is particularly unsuitable for struggling children. The chief contra-indication against its use is hepatic deficiency, whether caused by alcohol or other toxæmia, although it has been frequently and successfully given in cases of kala-azar with enlarged liver; also, possibly, heavy roundworm infection. The drug has a depressant effect upon both voluntary and involuntary muscle, and toxic doses depress the liver parenchyma, although recovery is, as a rule, rapid. Hence carbon tetrachloride, given with a subsequent purgative, is to-day probably the safest and most efficient mode of treatment on a large scale for hookworm infection.

Major Acton contributes two papers. One is on the action of selective or *specific drugs*. This depends (*a*) on their chemical constitution; thus alkaloids act as bases, and dextro- and lævo- rotatory salts may act in an entirely different manner; (*b*) on the hydrogen ion concentration of the tissues and fluids in which they act; (*c*) on their diffusibility through cell membranes. Some kill parasites by starvation, rendering their pabulum from the tissues unpalatable; others reduce the natural rate of multiplication of parasites to such a degree that the body resistance finally determines their demise. The ideal specific drug for any infection should destroy the invading micro-organisms at a concentration far below that toxic to the body; should have a high rate of diffusion throughout the body tissues and fluids; the site of its maximal concentration in the body should coincide with that of maximal multiplication of the invading micro-organisms; whilst, finally, the H ion concentration in which the causative micro-organisms best thrive should coincide with that at which the drug exerts its most potent effect. A little clear thinking on such lines might do much to improve present day therapy.

In a second paper the same author discusses the importance of the environment on drug actions. Thus quinine is lethal to *Paramœcium* in a dilution of 1 in 10,000 at a pH of 7; but in a dilution of 1 in 100,000 at a pH of 8; and the action of both emetine and quinine may be capable of immense improvement if the environment in which they act could only be rendered more alkaline. Inorganic basis and salts of heavy metals act best in an acid environment; some organic basis, such as quinine, emetine and some amines, such as trimethylamine, require an alkaline environment; others each require an optimum and pH of their own.

A. Roy discusses the merits of the Ayurvedic system, attempting to claim analogies between *vayu*, *pittya* and *kapha* with the hormones and endocrine secretions. In matters of diet he commends to the European practitioner the careful study made by the system, and raises several points calling for attention.

SURGERY.

In the field of surgery, the papers are even more individualistic than in that of medicine. Of the more general papers, perhaps that by Lt.-Col. H. Hallilay on the operative treatment of *Fractures* comes first. He is a warm advocate of Lane's method of plating, but insists that the technique shall be above reproach. "The setting of fractures is a myth," and no one has yet seen a Pott's fracture set with a perfect result. His technique involves several points which demand attention; the use of sterilised stockinet to surround the limb, no tourniquet; the raising of the periosteum en bloc with the superlying tissues by Ollier's rougine so as to preserve its blood supply; the use of Lane's forceps to hold the pieces in apposition and of the biggest plates and screws that the bones will take. Rarefying osteitis, he considers, means sepsis, whilst he emphatically condemns the pernicious practice of sawing off pointed ends. A series of very remarkably successful results concludes his most valuable paper. Enormous advances have been made in Europe during the war in the operative treatment of fractures, but India still teams with cripples with shortened or deformed limbs, the results of bad treatment of fractures. The scope for orthopædic surgery in such work is unlimited, but to be successful the most perfect aseptic technique is needed and the utmost attention to details. Capt. M. L. Treston's paper on rarer types of fracture of the radius and carpal bones illustrates the excellent results which may be attained by modern methods in these crippling injuries; whilst P. T. Kothary describes the appalling gangrene following the use of secret remedies in compound fracture cases.

Second come two informative contributions by Lt.-Col. E. W. C. Bradfield, the first dealing with the *surgery of chronic dyspepsia* in Indians. This breaks ground which is almost entirely new in India. He shews that gastric and duodenal ulcers are common enough, if looked for, and are as amenable to surgical treatment in India as in England. Over 80 such cases were operated on in ten months at Madras. The selection of cases suitable for operation is mainly dependent on the radiologist and the X-Ray findings to look for in such suspected cases are delay in the passage of the bismuth meal, bismuth deposited on an ulcer cavity, and notch due to spasm of the gastric wall. Prognosis is good if operation be resorted to early, but practitioners

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are loth to send cases to the surgeon, the Indian patient goes downhill faster than does the European, and late operation is attended with bad figures. The chronic abdomen is a subject of even greater importance in India than in England, since so many factors, special to the tropics, such as the dysenteries, sprue and the frequency of abdominal tuberculosis, are involved; whilst in a population infected to some 60 per cent. with *Oxyuris*, the appendix is of special importance.

In the Madras Hospital report for 1922 the same author considers the subject of *Tetanus*, contrasting Sibthorpe's figures for the decade ending 1886 with those for the decade ending 1922. Whilst modern aseptic surgery is banishing tetanus from the surgical wards in India, the case mortality—67 per cent.—still remains as high as ever. The reasons are that cases are treated in sheds and most unsuitable surroundings, and the want of antitetanic serum, which, in Madras in 1922 was only obtainable through the generosity of a private individual for poor patients. Of other papers on tetanus Major F. J. W. Porter, R.A.M.C. (retd.), details a case of intestinal obstruction followed by fatal tetanus, and raises the point as to whether tetanus bacilli ever escape from the gut into the tissues; whilst R. S. Tembe records five consecutive cases of recovery under treatment with serum and injections of carbolic acid.

Dr. J. Gravesen analyses the results of using artificial pneumothorax and other *surgical methods in phthisis* at Madanapalle, giving full details of technique. Of 62 cases treated by pneumothorax, evidence is available as to end-results in 54; of whom 34 benefited but temporarily, 20 benefited very markedly, some returning to their occupations. When fluid is present a dual apparatus for gradual withdrawal of the fluid plus the injection of air or nitrogen is advised. Capt. R. V. Rajam records a case of pyo-pneumothorax following pneumonia, and pointing as a superficial abscess in the scapular region.

Many interesting *abdominal cases* have been recorded during the year. Dr. S. Bannerjea records a case of hydatid of the liver cured by aspiration, and Dr. E. F. Neave a case in which cysts were enucleated from both lobes of the liver of a Mahomedan child aged 12, who subsequently recovered. Lt.-Col. W. W. Jeudwine calls attention to cases—usually fatal—resembling paralytic ileus occurring apart from any recognisable cause—a type of case which the writer has encountered and which is probably far from rare in civil surgency work in India. The true ætiology is doubtful. The same writer comments on the sort of cases that a civil surgeon in India has to tackle—a dermoid cyst in the abdomen of a girl of 14, a case of congenital stricture of the urethra in a boy of 3, and a congenital lymphiangioma in a child of 7 months of age, as a month's sample. Cases of rupture of the intestine rarely survive for more than 24 hours before they come to operation, but Dr. L. W. Hefferman records a successful case of suture after this long interval; whilst Major Porter's case of recovery after an operation for intestinal obstruction following an operation for appendicitis and general peritonitis, illustrates the acquired immunity which seems to make the peritoneum more tolerant of a second operation.

A case of *splenectomy* on a spleen transposed to the right side of the abdomen is recorded by C. P. Ipe; and another for a stab wound of an enlarged spleen by Dr. Hefferman. One of the most amazing cases in the literature is that recorded by Lt.-Col. A. J. Vernon Betts. A Mahomedan woman, aged 28, who had suffered from repeated attacks of malaria, was admitted to hospital with a hard, impacted tumour in the true pelvis. A diagnosis of uterine fibroid having been made, laparotomy was carried out, but the tumour proved to be a wandering spleen with a long pedicle, impacted in the pelvis.

Major V. N. Whitamore discusses cholelithiasis and its significance, and Capt. J. C. De the ætiology of Hirschsprung's disease, of which a case of congenital origin in a boy of 16 was very much relieved by medicinal measures alone. Cases of imperforate anus are fairly common, but the co-existence of a communication with the bladder is very rare, and Dr. J. M. Chopra is to be congratulated on the successful issue of his case, in which this complication was met with. Major C. H. Reinhold records a case of irreducible inguinal hernia in an infant, the obstruction being due to a mass of enlarged mesenteric glands. Major W. R. Stewart records a most interesting line of treatment of *psoas abscess* by oxygen inflation. The patient had a double psoas abscess and the two cavities communicated. Each was in turn aspirated and then distended with oxygen. There were traces of oxygen in the abscess cavities up to three weeks later, and the patient made an excellent recovery. S. Subhao Rao describes a case of intestinal obstruction in a woman aged 20, due to the formation of a complete adventitious sac, 6 by 3½ in. in size, formed by cicatricisation of chronic adhesive peritonitis, and containing five loops of small intestine closely compressed and adherent to one another. Major R. F. A. MacGregor comments on the rate of growth of vesical calculi; a patient had a stone removed from his bladder in 1914; 8 years and 3 months later he returned with two stones, one weighing a drachm, the other a tiny facetted one.

Perhaps the most interesting abdominal case, however, is that recorded by Colonel W. G. Pridmore. A clerk swallowed an entire lower artifical denture whilst taking his tea one day at 4-15 p.m. Being awakened by violent colic at 2 a.m., he ate one lb. of bread. The next day he did his work as usual and was then despatched to Madras for X-ray examination. Whilst about to be X-rayed, he had a desire to defæcate, and passed the denture entire per rectum 66 hours and 50 minutes after having swallowed it.

The method of transplanting skin by *tube grafts* is of very recent introduction and is capable of wide application in this country, where mutilating burns and ulcers are so common. Dr. Hefferman's interesting account of the use of this method in a case of cancrum oris is, we believe, the first recorded in this country. *Tumours* are often allowed to grow to a very large size in India before the surgeon is applied to for relief; and the cases of enormous lipomata recorded by Drs. G. C. Ramsay and L. W. Hefferman are typical of the sort of work which is encountered in rural areas in India, but is never seen in Europe.

Professor W. Burridge calls the attention of surgeons to the importance of thyroid hormone in determining the energy output of the heart. When total thyroidectomy is performed, this supply is suddenly cut off, and this may be one factor in the post-operative mortality. The moral is to give small doses of thyroid extract to such patients after operation. Dr. F. R. Parakh draws attention to the difficulty experienced in the preliminary ligature of the large vessels when amputating at the shoulder. He advocates commencing with a posterior incision from the clavicular attachment of the sterno-mastoid down the axillary border of the scapula to its angle. As the limb falls away of its own weight, the large vessels are exposed and can more readily be tied from this line of approach. Of *malignant disease* Dr. E. F. Neave records an encysted ovarian sarcoma in a woman of 20, and a melanotic sarcoma of the rectum in a man of 53; and F. D. Bana a case of epithelioma of the larnyx misdiagnosed as gumma. K. N. Pradhan discusses the treatment of furunculosis of the auditory canal and mastoiditis by zinc and salicylate ionisation—a method which gives very promising results.

Of many further individual cases of interest several may be omitted as less important, but probably the palm must be awarded to Mangal Singh's use of a pair of midwifery forceps to remove an enormous stone from the bladder; whilst Dr. A. B. da Castro's quaint case of an accessory mouth of congenital origin—but (it seems to us)—possibly of accidental or self-inflicted origin, comes a good second.

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In response to a request for information as to surgical progress in India during 1923, Lt.-Col. F. P. Connor sends us the following notes:—

"It is perhaps not fully realised how much suffering and indirect mortality is caused to an enormous number of individuals by the complications of *Filarial Diseases*, —complications which are mostly surgical in character. The efforts made so far to combat these complications are absurdly small; and the pathological and surgical study of these conditions is to-day scarcely in advance of what it was in Sir Patrick Manson's day long ago. Anti-filarial prophylaxis is the ideal remedy, but short of this there may be added medicinal or surgical methods easy of application, if we only knew more of the essential pathology of the disease. Thus the conditions under which calcified guinea worms have been mistaken for many different states such as chronic rheumatism, sciatica, etc., are legion, and are easily remedied, if the true cause be looked for.

"Other conditions, supposed to be filarial in origin, such as *hydrocele*, may often not be filarial at all. Personally, I believe the usual type of hydrocele is not filarial at all, and in almost all early cases I find a typical œdema and acute congestion of the globus major of the epididymis with early adhesions. In later cases the sub-acute inflammation has gone, but there is thickening of the globus major and firm adhesions between the epididymis and the body of the testis, thus more or less obliterating the digital fossa. In spite of this, the hydrocele fluid is clear, and, so far I have found no bacterial infection present in the fluid or in the fluid expressed after puncture of the swollen epididymis.

"Such inflammation and subsequent thickening may be gonococcal, for past gonorrhœa is almost the rule with the ordinary class of hospital patient, but they are certainly not typical of gonorrhœa. Another class of case worthy of mention is that of thickened nodules occurring in the epididymis without hydrocele and without symptoms in the epididymis. These appear to be very much more common in the East than in Europe. They are very suggestive of tubercular epididymitis, but do not follow a course similar to that of the latter disease. I believe that some of these cases are of streptococcal origin, and this hypothesis would explain the comparative commonness of acute streptococcal cellulitis or thrombosis of the spermatic cord seen in India.

"More light is badly needed on the pathology of these conditions before adequate treatment can become possible."

Discussion as to the most suitable *anæsthetics* for use in India still continues. Lt.-Col. H. C. Keates is faithful to chloroform. In more than 20 years' experience of it in India he has only seen two deaths, and both were due to delayed chloroform poisoning. This and spinal analgesia constitute his practice. Major Porter, R. A. M. C. (retd.), pleads for the far more general use of spinal analgesia in India. He has used it now for 11 years to the practical exclusion of all other anæsthetics. After a preliminary injection of morphia and hyoscine, he advocates the injection of 10 minims of adrenalin solution three minutes before the spinal injection is given, in order to avoid any sudden fall of blood pressure. He uses stovaine-glucose ampoules, obtained from Messrs. Poulenc Frères. Dr. D. N. Kalayanvala is also a strong advocate of spinal analgesia. He takes first a preliminary blood pressure reading, avoiding spinal analgesia if the pressure is below 95 mm. Next three preliminary injections of omnopon scopalamine are given at half hourly intervals. The track for spinal puncture is then cocained, and the intra-spinal pressure is recorded on a special apparatus before the injection is given. Throughout operation the blood pressure is continuously recorded, and should it drop to below 90 mm. at any time, restorative measures should be taken.

If we may venture a remark with regard to surgical matters in India, it is that the necessity for team work in Indian surgical problems has yet to be fully appreciated.

HYGIENE AND ALLIED SUBJECTS.

Perhaps the most outstanding event of the year was the Fifth Annual Congress of the Far Eastern Association of Tropical Medicine in Singapore in September, a matter fully dealt with in our last issue. The second is probably the publication in *Science Progress* for July of an article by Colonel W. G. King (retd.), in which he vigorously attacks the policy—or rather the complete want of any settled policy—of Government with regard to public health matters in India. In 1859 a Royal Commission enquired into the "sanitary" state of matters in India; the mortality in the British Army in India was found to be 69 per mille per annum; that of the Indian Army 20 per mille, whilst British officers died at the rate of 38 per mille per annum. In Civil jails the annual death rates varied from 84 to 120 per mille. As the result of organised sanitary activities introduced by officers of the I. M. S. in connection with these controlled populations, these death rates were reduced for the period 1910-1914 to 4.36 per mille for British troops, 4.39 per mille for Indian troops, and 21.5 per mille for prisoners.

If these results can be accomplished by organised army sanitation, claims Colonel King, similar ones could be obtained by organised civil sanitation. But here there is no policy. Mistaken policy has attempted time after time to subordinate the Public Health Department to the Medical one; whilst both are under the thumb of the Educational Department, which is their greatest rival for expenditure from public revenues. Devolution being the order of the day, public health matters are devoluted from Imperial on to Provincial Governments, and from them on to District and Municipal Boards (with what results analysis of report after report in our annual report columns shews), and by them on to subordinate and menial staff. Whilst Great Britain now possesses an organised Ministry of Health, controlling and—above all—co-ordinating public health, medical relief, medical research and insurance; and whilst such great international organisations as the Rockefeller Foundation and the Health Committee of the League of Nations are devising and carrying out great beneficial schemes with a world-wide scope, in India public health organisation remains subordinate, nebulous, a century or so behind the times. An all-India Ministry of Health and an all-India Public Health Service are the suggested remedies.

Lt.-Col. J. W. Cornwall follows this lead, but from a different angle. In a paper on the departures from health which are due to the negligence, ignorance and self-indulgence of man, he claims that the majority of diseases are preventable, and "if preventable, why not prevented?" Further, the training of public health officials is all wrong, and the system in India a slavish model of a system which, even in Europe, is now arousing dissatisfaction. Public health officials do *not* require a medical degree for the efficient performance of their duties; what they require, and now do not get, is a specialised training to fit them for their job.

Considerations of space here prohibit us from attempting any review of the many annual public health reports reviewed in our columns, but from Bombay to Singapore the tale is the same. Vital statistics, the very foundation of all public health work in India, are so inaccurate as to be nearly worthless. Probably urban death rates are about the only accurate vital statistics in India. Census and public health provincial reports are hopelessly at variance; and it is open to any politician to argue, with regard to any Province, either that it is going to the dogs, or that it is really flourishing. The populations of India continue to be swept by preventable epidemic and endemic diseases, mortality rates in many districts appear to be in excess of birth rates, whilst dirty midwifery and an appalling infantile mortality prevail. Here and there different organisations with inadequate personnel and still more inadequate funds attempt to cope with the impossible situation; but the real cure lies elsewhere. The present degree of efficiency in public health matters in Great

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Britain and America was only brought about in response to the demand of an educated public opinion. To only a very limited degree can public health measures be imposed on an unwilling population from without. What is required is first to raise the standard of medical education in India to such a level that every medical practitioner in the land will become a centre for the diffusion of public health knowledge; secondly, to make a knowledge of personal and public hygiene a subject for every schoolboy in the land, and for every university student. But the don and the pedagogue still dominate our mistaken educational policy, hygiene has still only indirect representation in the counsels of state, and progress—such as it is—is chiefly the result of the conscientious labours of a small and devoted band of workers. Colonel King's article is no mere voice in the wilderness; it epitomises the experience of every public health worker in the land.

If we may give a single illustration here of the unreliability of vital statistics in India it is the annual report by Major A. J. H. Russell for Madras, 1921. No less than 36 rural towns recorded a death rate of less than 10 per mille. If these figures are true (which, of course, they are not) we wonder why these favoured spots are not immediately converted into national sanatoria. Dr. J. E. Sandilands reports that the official figures for infant mortality in 1922 among the Jain community in Bombay record a figure of 1,600 deaths per mille of infants born during the year. If such figures were true (which they are not) the community would cease to exist in some fifteen years.

Malaria.—Major F. W. Cragg, in an interesting note, draws attention to the zoophilism of mosquitoes as a factor in malarial epidemics. Given a year or two of high food prices or of famine in a district, the cattle die off, and the carrying anophelines, which would normally feed on the cattle, are driven to feed on man. Lt.-Cols. S. R. Christophers and W. F. Harvey describe the anti-malarial organisation in the Federated Malay States and the Dutch East Indies. Colonel Christophers gives a remarkably interesting account of hyper-endemic malaria in the coal mining camps at Singbhum. The spleen rates in different areas varies from 65 to 77 per cent.; whilst adults shew a 10 per cent. spleen rate; and the endemic index is 85 per cent. What happens here is that almost all young infants pass for the first two or three years of life during a phase of acute malarial infestation, and this is followed by a period of immune infestation, during which they remain infected and as carriers, but are free from symptoms. The tract of country concerned consists of jungle clad hills with *A. willmori* and *A. listoni,* the latter being the carrier incriminated, breeding in the streams. European families coming into the hyper-endemic become heavily infected. In many instances he notes that it would probably be cheaper to build new bungalows on new sites rather than train streams.

Dr. C. Strickland contributes a malarial survey of Sawantwadi State. Here the virulent malarial zones were found to lie above the spurs of the Deccan foothills. *A. maculatus* was incriminated as the chief carrier, and the increase in malaria may be attributable to the jungle clearing, which encourages the breeding of this species. Capt. B. S. Chalam and Lt.-Col. T. C. McCombie Young describe a malarial survey of a sugar estate in Kamrup. The chief anophelines found were *A. vagus* and *A. listoni,* the latter being incriminated. These were breeding in a swampy stream running through the estate; the nearer this stream the lines or houses, the greater the incidence of malaria. What had happened, in fact, was that all the best land had been taken for cane plantation, and only the malarious residue left upon which to build lines and bungalows.

Plague.—Major J. Taylor and Dr. G. D. Chitre describe a new electrical rat guard for ships' hawsers. This consists of a triangular box 2½ feet long surrounding the hawser and wired in on all sides. It was experimentally tested in a rat-proof room. When a current of 230 volts was led through, the rats were unable to pass the guard to the grain placed above it, (their only food supply), but with the usual ship's voltage of 110 volts some of the food was consumed. Lt.-Col. W. Glen Liston and Dr. S. N. Ghore describe fully the fumigation of ships with Liston's cyanide fumigator, a demonstration of which was given to a congress of port health officers and others at Bombay during the year. The apparatus is compact, simple, safe and ingenious. HCN gas is generated by a mixture of two solutions and is blown by fans into the various holds of the ship. It is thus evenly distributed, but high concentrations can be developed at will in any particular spot desired. A ship can be completely fumigated in three hours, and the method is far better than the one by dumping fixture. The fans also rapidly clear the gas at the rate of from 500 to 1,000 c. ft. of fresh air introduced per minute.

An apparatus for using HCN gas on a small scale for the fumigation of grain supplies, etc., is described by Capt. L. A. P. Anderson. The gas is generated from a mixture in flasks of KCN and H_2SO_4, and an exposure of 3½ to 4 hours kills all fleas, weevils and other insects. Two maunds can be dealt with at a time, whereas 24 hours' exposure does not destroy the germinating power of the grain.

Ankylostomiasis.—Lt.-Col. Clayton Lane (retd.), emphasises several important points, such as that the relationship between the number of hookworms harboured and the degree of loss of efficacy by the individual is by no means proved, that possibly infection, in a dry soil, may be limited to a small area around the passed stool, and that much further research work remains to be done of the whole question, research work which may help to materially reduce the cost of anti-hookworm campaigns in the light of further and more accurate knowledge. Dr. K. S. Mhaskar, on an analysis of methods for the detection of hookworm infection, concludes that the finding of the ova in the fæces is the most simple, rapid and practicable of methods, and that the results obtained are highly accurate. He also comments on the fact that humidity and intensity of infection go together, infestation in Madras being maximal in November to January, when humidity is also maximal. V. K. Menon advocates a very simple technique for the examination of stools; a piece of fæces about the size of the tip of the little finger is emulsified in lactophenol, is spread on a slide and examined for ova with a low objective.

The enquiry by Father Caius and Dr. Mhaskar into anthelmintics was continued and concluded, and a very large number of drugs investigated during the year, antiseptics, volatile and non-volatile oils, cathartics, thymol, menthol and others. They conclude their enquiry by stating that they find carbon tetrachloride to be the most efficient anthelmintic for both ankylostomes and necators, with 5 c.c. as an optimum dose for an adult male Tamil. It removes 99.7 per cent. of the worms present, and gives 83 per cent. of cures. Further it is easily standardised, and does not deteriorate. Its safety in use, however, demands further investigation. The next best drugs are thymol, beta naphthol and oil of chenopodium. No general relationship could be made out between chemical composition and anthelmintic properties: whilst the action appears to be a specific one. The same authors also examine the question of reinfection after cure. They find that the benefit conferred lasts for a year, but that annual treatments during the monsoon months would decidedly improve the general health of the infected.

Dr. Mhaskar and Dr. J. F. Kendrick report on anti-hookworm campaigns in the tea estates of Madras. The worms present averaged 68 per adult male, 40 per adult female and 30 per child; whilst in some heavily infected areas, such as Panchamas, the average rose to 169 per person. The hæmoglobin percentage, 70 per cent. shewed no correlation to the degree of infestation. One dose of thymol or of beta naphthol reduces 90 per cent. of the infection; neither treatment can be regarded as entirely free from all risks; the

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treatment is best given in the early morning on a fasting stomach, and thymol is about a quarter of the price of beta naphthol. They comment on the increased marketable value of treated labour forces and reduced general mortality and morbidity rates.

Dr. J. W. Tomb analyses hookworm infestation in the Bengal coalfields. 72 per cent. of underground labour and 53 per cent. of surface labour was found to be infected. 70 per cent. of the worms removed were necator. The hæmoglobin index in the infected was 65 per cent. as against 80 per cent. in the non-infected; whilst the surrounding agricultural population shewed less infection. He concludes that there is no practical remedy within reach, and that there is little if any evidence of the presence of hookworm disease, as against hookworm infection.

Dr. G. C. Ramsay raises the question of pigs as disseminators of ankylostomiasis. He shews that the health is better in such tea gardens as do not permit their coolies to keep pigs than in the others; and has found ova of hookworm, roundworm and whipworm in the stomach, and even buccal cavity and œsophagus of pigs. *Balantidium coli* he also believes to be relatively common in these animals in Assam. Dr. J. B. McVail enquires whether these were ova of human helminths or of natural parasites of the pigs concerned; he shews that ova of human ankylostomes will not survive a temperature higher than 98.4° F for any length of time, whereas the temperature of the pig's intestine must be about 104°F. S. K. Roy discusses the developmental stages of *Strongyloides stercoralis* from the ovum to mature stages, and associates this parasite with anæmia.

Vaccination.—Lt.-Cols. W. F. Harvey and S. R. Christophers, returning from the Fourth Congress of the Far Eastern Medical Association, proceeded to describe Nijland's technique in Java for maintaining vaccinial lymph at full potency. The secret of Nijland's technique is that he never uses the same species of animal twice running as a vaccinifer; the virus is passaged successively into a rabbit, cow calf, and buffalo in rotation.

Majors J. Cunningham and J. A. Cruickshank publish a series of papers and reports which constitute a notable advance in the Madras Presidency. Dissatisfied with the increasing fall in the success rate with lanolinated lymph, the Directors of the King Institute have been experimenting for some years with the possibility of obtaining a glycerinated lymph that will give better results. The success rates had fallen from 95 per cent. in 1907 to 77 per cent. in 1919. Adapting Nijland's technique, and a new glycerinated lymph they have produced supplies which, on experimental test on the Saidpet range and elsewhere in Madras, gave a success rate of 96.7 per cent. They advocate (a), the use of Nijland's technique; (b) to leave over the question of the proposed establishment of a seed depot in the hills until further experience has been gained with the present procedure; (c) to continue the present procedure; and (d) to stop vaccination in the Presidency during the three hot weather months, and carry on intensive campaigns in the cold weather. In addition they demonstrate the necessity for new standards in testing lymphs, and describe a new test on the dilution principle, by which the lymph is diluted to a given degree and sown in lines, the results being estimated by the number of discrete vesicles per linear inch sown. This gives reliable results, both in the vaccine institute and in the field. With regard to the claim made by S. S. Bey that intravenous injections of tartar emetic may give good results in variola, they shew that such injections have at least no effect at all upon vaccinial lesions in the calf.

With regard to *Rabies*, the publication of Major Acton and Colonel Harvey's big memoir on the degree of efficacy of antirabic inoculation raises questions of fundamental importance; and it seems to us that this memoir has not received half the attention from the medical journals that it should have done. In brief, whilst their conclusions are studiously refrained, the entire memoir constitutes an attack on the whole of the Pasteurian method. Experimental animals may owe their supposed immunity rather to the difficulties of experimental trephining than to real immunity conferred by the treatment; the wider and more careful the enquiry into the real mortality from hydrophobia among the untreated, the lower becomes this figure; whilst, in a general mixed population under treatment at a Pasteur Institute, which includes persons undoubtedly not at risk at all, persons at little risk if any, and persons at varying degrees of risk, the usual annual mortality of about one per cent. may not be far from the corresponding figure for a similar untreated population. Here to-day we still work in the dark, and still await the only discovery which will clear up the problems of rabies—the discovery and isolation of the micro-organism of the disease.

The demand by the public for the issue of antirabic vaccine having become insistent, the Coonoor Instiute is now trying a large scale experiment by sending out the vaccine by post to government headquarters hospitals throughout the Presidency; so that cases may be treated at any headquarters hospital. This issue is frankly experimental; and at other institutes the directors concerned refuse to guarantee the potency (whatever it may be) of the vaccine after it has left the institute. Two or three years must elapse before the statistical results of the Madras experiment, collected on a large scale basis, can be contrasted with those at the established antirabic centres in India. Lt.-Col. A. E. Hammerton, R. A. M. C., describes the foundation of a Pasteur Institute at Bagdad, discussing cost and difficulties encountered, and the limitations of treatment.

Water Supplies.—The provision of safe water supplies is a paramount problem in India. Under certain conditions the introduction of a pure water supply reduces not only the mortality from water-borne diseases, but from general causes. This, the Mills-Reincke phenomenon, is discussed by T. N. S. Raghava Chari in its application to India, who finds that the Indian statistics do not support the theorem. The reason is that in India statistics are generally unreliable; Calcutta, Howrah and Darjeeling, for instance, have fully protected water supplies, yet these places head the list in incidence of dysentery and diarrhœa for Bengal; the reason being that the records are probably fairly accurate for these urban municipalities, and wholly unreliable for the others. These findings probably explain Mr. V. D. Pillai's note, as an engineer, on the failure of improved death rates to follow upon the introduction of pure water supplies in certain Madras towns. J. L. Pinto notes upon the improvement of the Poona water supply with simple storage. In this supply the water settles for three days before entering the distributing mains. Observations go to show that a 75 per cent. reduction in bacterial content follows; but this does not apply to monsoon weather and heavy rain.

Major A. D. Stewart, in an interesting paper on *Disinfectants*, comments on the need to think out clearly beforehand what is wanted. A simple deodorant, a disinfectant which will kill ordinary fæcal bacilli, or a strong spore-bearing germicide may be wanted under different circumstances. Finally, ease of emulsification and cost are also factors concerned. Formaldehyde is an efficient germicide, but of no value as an insecticide; sulphur dioxide is the reverse. Quicklime is a most suitable and generally available disinfectant for fæces. The chlorine derivatives have a wide range of applicability, both in public health work in water sterilisation and in surgery. Corrosive sublimate is a most powerful germicide, but is too dangerous for use in public health work. Many of the coal tar products so much advertised on the market are merely deodorants; some of them do not emulsify with saline, and this group of antiseptics tend in general to have an over-rated value. Major Stewart's comments upon

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the price of the apparatus for the production of "electrolytic chlorogen" have roused a reply from Mr. C. M. Hutchinson, who shews that the main item in cost is that of the pure platinum electrodes, and that the yield on a working plant soon secures a profit.

Of *Legislation* on public health matters there has been but little of interest during the year,—a fact which reinforces Colonel King's strictures. The new provisions of the Factories' Act have come into operation and should eventually result in a saving of child life and an improvement in adult physique. A series of most interesting reports by Miss D. Curjel, M.B., on the conditions of female labour in the tea gardens and in the mines and jute mills of Bengal has received attention in our columns. She strongly advocates the introduction of female health visitors and resident midwives, together with maternity benefit. The Calcutta Municipal Act has greatly extended the boundaries of Calcutta city, and many of the surrounding insanitary areas included will doubtless become more salubrious and be no longer the menace to the city that they are at present.

Major G. G. Jolly describes a new fly-proof latrine seat which appears to be simple in construction, easily attended to, easily repaired, and most efficient. Dr. A. Hamid contributes a scheme for the medical inspection of elementary schools, which is well drafted, but which we fear will not be encouraged by the parents and teachers concerned.

MIDWIFERY AND GYNÆCOLOGY.

The year was chiefly noteworthy for a great stimulus given to the teaching of obstetrics and gynæcology in India. The General Medical Council insisted on a course of practical obstetrics and personal attendance on delivery cases, before the degrees of Indian universities could be recognised by the Council. As a result, fourth year students from Lucknow, Lahore and Burma universities are now sent to the Government Maternity Hospital, Madras, for one month, during which period they work as intern students and have considerable facilities for seeing obstetric operations and personally conducting labour cases. This has improved the training in midwifery for university students and has helped to remove a long standing defect in medical education in India.

The Madras Government Maternity Hospital is now a well recognised centre for post-gradute training in midwifery and gynæcology, and medical men from all over India, Ceylon, Burma and the Straits Settlements are now coming in increasing numbers to take out a course of practical instruction in midwifery and gynæcology. A large number of Indian medical graduates who were given permanent commissions in the I. M. S. were deputed by the Government of India to attend a course of such instruction for three months, and occasionally officers of the R. A. M. C., stationed in Madras districts, have also been so deputed. The large amount of clinical material available, and the facilities for practical work are so great that this hospital is unique in the East, and is certainly the best centre for post-graduate training in obstetrics and gynæcology.

Lt.-Col C. A. F. Hingston and Dr. A. L. Mudalier continue their series of gleanings from the Madras Government Maternity Hospital. With regard to *Eclampsia* the essential line of treatment they believe to be to reduce blood pressure, either by venesection or by hypodermic injections of veratrone. The patient must be treated in a darkened and fully prepared eclampsia room. Following on chloroform anæsthesia for obstetric or gynæcological operations, they find that the inhalation of aromatic spirits of ammonia for from 10 to 15 minutes prevents vomiting and lessens post-operative trouble. Ventro-fixation as a treatment for retroversion of the uterus they regard as a sound line of treatment.

The same authors analyse the Madras statistics for the last ten years on *Extra-uterine Gestation*—104 cases. The condition is met with most commonly in multipara who have had a fairly long interval of sterility, and occurs at all ages within the child-bearing period. Three types of cases are recognised:—(*a*) The acute, collapse type, which is apparently uncommon in Madras. (*b*) The case with irregular colicky pains and scanty hæmorrhagic discharge per vaginam—a type which is very common; and (*c*) the cases who complain only of chronic pain with constipation and painful micturition. The second type is very common and is often misdiagnosed as incomplete abortion or as uterine fibroid. A fourth type, (*d*), present few symptoms other than that of amenorrhœa. Instances of triplets in a Fallopian tube and repeated tubal pregnancies to the number of three are recorded. Expectant treatment in general is condemned; these cases should be sent for immediate operation—their best chance of recovery.

J. M. Das, in a paper on "Obstetric Impressions" comments on the ever-widening indications for Cæsarian section, on the need for prenatal care in such cases, and the necessity for operating at the time of election. Cases of ectopic gestation in India usually shew a blood-stained discharge per vaginam, and are often mistaken, with disastrous results, for cases of threatened or incomplete abortion or of uterine fibroid. With regard to post-partum hæmorrhage he emphasises the importance of partial or complete retention of the placenta; and gives statistics of the treatment of eclampsia at the Eden Hospital, Calcutta, for the years 1914-18, 71 cases with 13 deaths, together with a detailed memorandum of instructions for house residents and nurses in charge of such cases.

Lt.-Col. W. W. Jeudwine contributes three similar, yet dissimilar, cases of gynæcological interest, all with similar symptoms of an acute abdomen. The first was one of acute retroversion of the uterus in a constipated patient; the second one of acute prolapse of the ovary with strangulation of the tube and bowel; the third one of retroperitoneal *B. coli* abscess. Miss R. E. Veerana records a case of quintuplets; and Dr. Kedar Nath Das draws attention to the "Bengal Forceps," designed to meet the fact that the pelvic dimensions in Bengali women are different from those in English patients, and that therefore a special type of midwifery forceps is indicated. J. A. Rowland records a case of simultaneous presentation of the head, foot and hand, together with a sessile, sub-mucous fibroid. The child had to be dismembered and the mother died.

OPHTHALMOLOGY.

Cataract.—Capt. M. M. Cruickshank gives a detailed account of the complications encountered in 1,322 consecutive cases in Dr. Holland's clinic at Shikarpur. Cases found unsuitable for Smith's operation are the ox-eye type in plethoric individuals, double cataract in adult males where the zonular fibres are extra-resistant; glaucomatous cataract; traumatic cataract; and cases where legitimate pressure fails to dislocate the lens. The vitreous loss he assesses at 10 per cent. but considers the amount lost to be negligible. The most important lesson of all is the routine use of the tonometer before operation; as if the tension is over 70 mm. there is danger of choroidal hæmorrhage or other complications. Major F. F. Strother Smith reports a series of end results after Smith's operation, and comments on the importance of the toilet of the iris. A skilled operator and skilled and trained assistant are necessary. 17 cases are detailed with vision at 6|6 to 6|9. at periods of from 4 months to 13 years after operation.

Lt.-Col. R. H. Elliot (retd.), implores that ophthalmic surgeons in India will not depart from thorough antiseptic precautions, and, with regard to end results considers that where there is a will there is a way, and that those who wish to ascertain end results can evolve some system of doing so. Dr. Hari Shanker deals with vitreous escape in fat patients and in those with prominent eye-balls, and advocates special measures in such cases, whilst S. K. Ganguly records three cases of expulsive hæmorrhage after extraction, and advocates a preliminary iridectomy a week beforehand, a thorough

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preparation of the patient, bromides and morphia, and a gentle compressive bandage in such threatened cases. Major R. M. Dickson records the failure of a modified Barraquer apparatus where the vacuum was produced by mercury.

Major R. E. Wright, dealing with Barraquer's apparatus, records a complete success rate of 80 per cent. on 250 cases; whereas the figures for the ordinary Madras capsulotomy operation in 1922 were 1,124 operated on with 88 per cent. of complete successes, and a vitreous escape rate of only 1.8 per cent. He regards any eye in which there has been any vitreous loss as an eye potentially lost; trauma to the posterior capsule is followed by invasion of the vitreous by proliferative types of cells; and a study of results with Gullstrand's slit lamp and the corneal microscope in such cases shews this invasion.

The same author records the Madras figures for 1922 with regard to glaucoma, where 4 out of 15 cases blind for six months or more regained perception of light. At Madras it is now customary to exclude from operation all cases where infective conditions of the eyeball are traceable. S. K. Ganguly records a case of acute glaucoma in a student supervening upon an instillation of cocaine.

In trachoma D. D. Kapur advocates excision of the fornix; and H. R. Wadhwani a full operation under anæsthesia, expression with Knapp's roller forceps, vigorous use of copper sulphate stick—being careful to avoid the cornea,—argyrol instillations and boracic lotion irrigations.

Lt.-Col. E. A. R. Newman comments on the value of Berger's stereoscopic lenses in eye work, and Major H. C. Craggs, I.M.D., points out that such instruments as the binocular "handlupes" and corneal microscopes have been in use at Madras for some ten years. With regard to *Optic atrophy* Major Wright analyses the chief causes, which he classifies into (1), post-neuritic, of which syphilis is the most common cause; (2) secondary to glaucoma; (3) of renal origin, especially in chronic interstitial nephritis; (4) in the albuminuria of pregnancy; (5) toxic and retro-bulbar, as with the use of tobacco, methyl alcohol, lead, quinine, etc.; (6) due to cerebral tumour; (7) those with associated disease of the nasal or accessory sinuses and the teeth; and (8), the special types associated with the meningitic infections of childhood. The importance of syphilis in eye work, and especially in fundus cases, is enormous.

The same author describes a further second case of infection of the conjunctiva with *Rhinosporidium seeberi*, and a case of *Cysticercus cellulosæ* infection of the sub-conjunctival tissues. Both infections may be commoner than is usually supposed. In keratomalacia he finds feeding with liver juice a useful measure. A most interesting analysis of cases of bilateral enlargement of the lacrymal glands, due to a special type of lymphoid hyperplasia is also given by the same author in his 1922 report.

PATHOLOGY, BACTERIOLOGY, VACCINE THERAPY, ETC.

The presidential address at the Medical Research Section of the Indian Science Congress, 1922, was read by Major H. W. Acton who outlined the main problems to be faced and the methods necessary to co-ordinate men, munitions and equipment. Lt.-Col. W. F. Harvey and Capt. K. R. K. Iyengar continue their studies on *Vaccine Therapy*. There is no evidence that by increasing the dose given of an old vaccine the practitioner can make up for the loss of antigenic properties due to age, exposure to high temperatures, etc., of a vaccine. On studying the development of immunity in pigeons immunised with a *B. avisepticus* vaccine, there is little evidence of immunity up to seven days after the first inoculation, but after the second inoculation the immunity rises rapidly, and reaches its maximum at the 14th day, remaining at this level until the 30th day. The curves for true immunity and for agglutinin production are very different. Duration of protection lasts at a high level for some three months, but is almost lost five months later. Vaccines kept at temperatures of from 18 to 37°C for one month shewed no deterioration: a dose of even a dead antigen may prove undesirably toxic, and for each vaccine it is desirable to determine the relationship of the optimum dose for maximal protection to the toxic dose, as either too much or too little may fail to give true immunisation. Immunisation with relatively avirulent living organisms may give complete immunity with doses very much smaller than the lowest optimum prophylactic dose of dead vaccine, and immunisation with such living, avirulent strains will restore an immunity, originally due to injection of a dead vaccine, but subsequently lost.

The King Institute, Guindy, Madras, has made a gallant effort, by sending out circulars to doctors to whom autogenous vaccines were supplied, to assess the results obtained, but without success. Capt. R. H. Malone describes a modified opacity method of standardisation dependent upon the solubility of the micro-organisms concerned in bile solutions.

A. C. Vardon describes the preparation of desiccated nutrient media, and Dr. M. B. Soparkar comments on the value of heated, as against unheated, blood in the preparation of media for Pfeiffer's bacillus. Blood heated for 10 to 15 minutes at 67 to 70°C and added to the media gave the most luxuriant growth. J. N. Lal describes how media may be re-used. Trypsin should be added and the whole then autoclaved for an hour at 120°C. The same author has also tested the effect of exposure to tropical sunlight on sealed cultures. Direct sunlight was found to be very lethal; but storage in a dark cupboard at room temperature less so. The cholera vibrio proved far more susceptible than did such organisms as the typhosus, Shiga and Flexner bacilli and staphylococci.

Dr. C. G. Pandit has studied the Neisser-Wechsberg phenomenon. This phenomenon of inhibition occurs with hæmolytic as well as with bacteriolytic sera. It develops early in immunisation and tends to disappear as immunisation proceeds. It is not due to the action of any of the known antibodies produced, but probably to dissociation of the antigen-amboceptor complex, and the effect is specific.

S. C. Sen records a case of fatal bronchitis apparently due to *Monilia tropicalis* (Castellani), and Dr. L. W. Hefferman raises the question as to what are the criteria to determine the different types of leucocyte in doing a differential count. In *Protozoology*, the publication of Major Knowles's "Lecture Notes in Medical Protozoology" it is hoped will place in the hands of students and laboratory workers a synopsis of the subject, together with details of technique and a bibliography for reference. Major H. E. Shortt describes the use of a carbolised hæmatoxylin stain for the iron-hæmatoxylin method, in place of waiting for a ripened hæmatoxylin. Dr. G. C. Chatterji describes a new intestinal flagellate protozoon of man, but the description suggests a mixture of *Trichomonas* and *Embadomonas*, and his plates are far from convincing. Lt.-Col. F. de Mello of the Portugese Medical Service contributes a most striking and beautifully illustrated memoir on the neuromotor apparatus of *Eutrichomastix* of the lizard.

Major J. Taylor describes a very useful constant drop saline apparatus, applicable under many different conditions, the parts of which can easily be sterilised.

MISCELLANEA.

In *Medico-Legal* matters several points of interest arose during the year. Most of our readers will remember the Theobald case, where the patient died after taking a dose of liquid extract of nux vomica, inadvertently supplied by an unqualified compounder by mistake for a dose of liquid extract of ergot: several points of importance were raised during the trial, such as the employment (under expert supervision) of an unqualified compounder by a firm of chemists, the equipment needed in a nursing home for emergency poisoning and the like. A doctor in charge of a

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dispensary was accused of negligence with respect to a death under somewhat peculiar circumstances. He had given an intravenous injection of one of the salvarsan derivatives to a patient in hospital; two hours later the patient unexpectedly died; and he removed the body and handed it over to the relatives. The death was not certified, as apparently no such certification of deaths occurring in hospital was necessary by law. A post-mortem, held three days after death, disclosed the fact that gas was present in the right side of the heart and pulmonary artery, and a second medical man, who carried out the examination, attributed death to air embolism. Obviously however, under the circumstances, this charge could not be sustained, and the defendant was discharged.

In the annual 1922 report of Major T. C. Boyd as Chemical Examiner, Bengal, attention is drawn to the very common custom of adulterating country liquor with aconite; this increases the patient's thirst and his consumption, but may prove fatal. The poisons most commonly used are arsenic, aconite and yellow oleander, and S. Banerjee gives a full and interesting case-history of a case in which the last was used homicidally. Major C. Newcomb, Chemical Examiner, Madras, describes new tests for madar and the porophyroxin test for morphine. In the case of a girl of 10 poisoned by nux vomica juice, the stomach contents failed to shew strychnine and brucine, whereas they were abundantly present in the leaves consumed: indicating the possibility that in such cases the alkaloids concerned may be completely absorbed into the viscera without leaving traces in the stomach contents. He also gives details of a modified Florence's test for seminal stains, which has given reliable results in Madras.

Entomology.—The pages of our learned contemporary, the *Indian Journal of Medical Research*, have been filled with entomological papers,—17 in number,—which defy analysis to the ordinary medical man. Here there is a whole wealth of material with direct or indirect bearing upon medical problems. Mr. P. J. Barraud, F.E.S., F.Z.S., gives a revision of the Indian culicine mosquitoes, and Major J. A. Sintons a description of Indian sandflies,—a subject upon which fuller knowledge is urgently needed. The bed bug is the subject of two papers, Lt.-Col. J. W. Cornwall dealing with its salivary glands and sucking apparatus, and Major F. W. Cragg with its bionomics, with special reference to the relationships of the sexes. Colonel Cornwall also describes the salivary pump structures in blood sucking and in non-blood-sucking insects, and Lt.-Col. S. R. Christophers deals with the genital organs and their development in the mosquito. Major R. E. Wright gives an account of a further case of infection of the frontal sinuses with myiasis; the patient was a child aged one year, and the infecting agent larvæ of *Chrysomyia bezziana*. Mr. R. Senior White raises interesting questions with reference to the "eye-fly," *Siphunculina funicola*—(an insect very prevalent in Assam during the rains and suspected of possibly transmitting epidemic conjunctivitis and Naga sore),—and shews that, although not a true biting insect in the full sense of the term, it can yet pierce the dried up surface of a pre-existing ulcer and possibly convey infection passively.

SERVICE NOTES.

The visit of the Royal Commission on the superior Civil Services in India is a matter of present and extreme interest. Whether the result of such deliberations will be to end or to mend the Indian Medical Service remains to be seen.

During the year, the Secretary of State in accordance with the Devolution Rules, sanctioned the reservation of a certain fixed number of appointments in the various Provinces, and under the Foreign and Political Department and the Government of India, for officers of the I. M. S.

The rules under which officers of the I. M. S. obtain study leave were revised during the year. Officers in civil employ proceeding on leave under the Fundamental Rules can now convert their leave on full average salary *plus* lodging allowance for the period in question.

The appointment of Director of Medical Services in India, Army Headquarters, has been thrown open to the Indian Medical Service. Under the new orders the appointment will be filled alternately by officers of the I. M. S. and of the R. A. M. C. Major-General Bowle Evans was the first I. M. S. officer to be appointed as D. M. S., India, under the revised procedure. Unfortunately, his health broke down after a short period of office and he has been compelled to proceed on leave pending retirement.

The death of Major-General Sir William Rice Edwards, K.C.B., K.C.I.E., C.B., C.M.G., M.D., F.R.C.S.E., K.H.P., late Director General, Indian Medical Service is reported with deep regret. Major-General Edwards had been appointed to be the representative of the Government of India on the International Sanitary Convention.

The extent to which the cadre of the I. M. S. is being depleted is indicated in the following statement for 1923,—which is complete only to the 30th November, 1923, and which does not stand for a full calendar year:—

Losses by death.—Lt.-Cols. E. A. C. Mathews and J. C. Robertson; Major S. C Chuckerbutty; Capts. A. B. Pestonji, C. C. Ittycheria and B. Jones; Lieut. H. Summers.

Resigned.—Capts. E. W. Mann and O. Wilson; Lieut. H. McNair; also many officers with temporary commissions.

Retired.—Major-Generals Sir W. R. Edwards, Sir C. C. Manifold and J. B. Smith; Cols. H. F. Cleveland, R. G. Turner, H. Austin Smith; P. F. Chapman; Lt.-Cols. E. C. MacLeod, E. H. B. Stanley, B. R. Chatterton, E. A. R. Newman, S. H. Lee Abbott, H. D. Peile, N. R. J. Rainer, C. E. Williams, W. J. Niblock, R. K. Mitter, W. H. Dickinson, S. H. Burnett, J. Penny and D. M. Davidson; Bvt. Lt.-Col. R. S. Kennedy; Majors E. C. Taylor, N. H. Hume, A. C. Ingram, C. C. C. Shaw, D. M. C. Church, H. S. Hutchison, J. Smalley and G. Tate.

In an ordinary year a loss of 40 to 45 officers from the permanent service cadre would have been replaced by a similar number of entrants. But, as is well known, at present the permanent cadre is very markedly below strength, new entrants are few and scarce, and it would appear with regard to the Indian Medical Service that the chief problem facing the Public Services' Commission is not to lay down any fixed proportion of European to Indian officers recruited, but to devise means to obtain recruits in sufficient number of good status of either nationality.

R. KNOWLES.

Current Topics.

Progress in X-rays and Electro-Therapy, 1923.

IN response to a request for information with regard to the progress of X-rays and electro-therapy in India in 1923, Lt.-Col. A. C. Walters, I.M.S., Superintendent of the X-Ray Institute at Dehra Dun sends us the following notes, which are so authoritative and of such specialised value that we reproduce them separately and apart from the general review of the Indian medical year, 1923.

"In connection with X-ray work and electro-therapy, the principal activities of the past year have centred round the employment of high tension transformers for radiography, of efficient protection against X-ray injury, and specialised apparatus for deep therapy.

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"Small high tension transformers, operating on any alternating current from 75 volts to 220 volts have been examined. The transformers are oil immersed, and usually contain in the same containing vessel a small step down or auto-transformer for heating the filament of the Coolidge tube.

"Formerly the 10 M. A. type of Coolidge tube was employed. But latterly a tube of similar type operating up to 30 M. A. has been in general use. These tubes, so long as they are worked within the prescribed limits, are capable of suppressing one phase of the alternating high tension current and utilising the other. The amount of energy produced by the transformer is, therefore, reduced by one half. But these sets have been found to give excellent radiographic results.

"In difficult cases, such as abdominal examinations of stout patients, one or two intensifying screens have been employed. The modern intensifying screens, especially those produced by the Patterson Company of America are entirely free from grain, and shorten the exposure to about 1|5th of the normal for each screen used. The Superintendent has carried out a number of tests in connection with the use of both single and double intensifying screens.

"The Eastman duplitised film has been found to give an acceleration when used with two first class screens, which reduces the proper exposure to about ⅛th of the normal exposure of a plate when no screen is employed. A single screen with a good X-ray plate such as the Ilford or Wratten & Wainright reduces the exposure to about ¼th. Duplitised films are very satisfactory if carefully developed in small tanks specially arranged for the purpose. But any contact of the wet film with the developing tank, or otherwise, is liable to produce scratches and markings which are most undesirable in an X-ray negative. The experience gained here seems to show that provided these films are developed by careful and competent operators the results produced are most satisfactory. But the development cannot be entrusted to ordinary dark room attendants. If there is any carelessness during the process of development the resulting negative will not only be valueless, but will be liable to be extremely misleading.

"A special plate has been placed on the market recently, and has been examined at the X-ray Institute. The makers of the plate claimed that by covering the ordinary photographic emulsion with an intensifying film they would not only produce the intensifying effect of the ordinary accelerating screens, but, by securing better contact, they would produce clearer definition; that the intensifying film could be easily removed before development of the negative was begun. A number of these plates have been examined, but it has been found impossible to remove the intensifying film completely without damage to the emulsion. The makers' claims were so insistent, and the idea so attractive, that a number of experiments were carried out before a decision was finally arrived at. It was found that the intensifying film could not be satisfactorily removed, no matter what steps were taken to facilitate this operation, and it is now understood that the makers have been unable to establish their original claims, and that the plate, at any rate in its original form, has been withdrawn from the market.

"The importance of efficient protection against X-ray injury has been emphasised by the danger which follows the use of Coolidge tubes with high powered apparatus. Formerly 100 kilo volts was regarded as about the maximum effective voltage at the tube terminals; but recently very much higher voltage has been employed, with the result that X-rays of very high penetration have been produced. Protective apparatus which was satisfactory with the lower powered sets, has been found quite insufficient when used with modern high powered installations. The well ventilated and well lighted cubicle system has been used for deep therapy applications with very satisfactory results. A number of samples of protective rubber and protective glass have been examined. Different samples differ widely in protective value, but the following figures may be taken as representing the equivalent values with ordinarily a fair margin of safety:—

1.M. M. sheet lead is equivalent to 4M. M. protective rubber and is equivalent to 8.M. M. protective glass.

"The ease with which all rubber preparations perish in a tropical climate must always be borne in mind, and if lead rubber protection is employed, frequent tests for efficiency must be carried out.

"The application of deep therapy in accordance with the methods of the Erlangen school is still in the experimental stage in India. Cases of uterine fibroid have been treated with most satisfactory results. Cases of malignant disease have been under observation and the results achieved will be recorded in due course.

"Some improvements in the design of diathermy instruments have been carried out during the past year. The spark gap has always represented the principal source of difficulty with these instruments. A spark gap which is easily adjustable, and which requires only a small quantity of rectified spirit, instead of the coal gas or hydrogen dielectric of former times, has been experimented with. This instrument has proved very satisfactory in operation, and only requires opening up and cleaning about once a week. Diathermy application has been successfully applied in a large number of cases, and when instruments capable of producing higher output are available, the field of usefulness is likely to be considerably enlarged. The Superintendent has experimented with an interrupted low tension galvanic current with very satisfactory results. The current is obtained by employing the ordinary A. C. main. This current is passed through a highly exhausted bulb of special construction, which reduces the voltage considerably, and suppresses one phase of the alternating supply. The resulting current is a pulsating unidirectional current of comparatively low voltage, which is applied after interposing suitable resistance, by means either of pads or by the Schnee's bath. It has the advantage of producing powerful contractions, powerful local stimulation, and being entirely free from painful sensations."

Some Rare Diseases of the Skin in the Tropics.

AT a meeting on October 10, 1923, of the Medical Section of the Asiatic Society of Bengal, Major H. W. Acton, I. M. S. read a paper on "Some Rare Diseases of the Skin in the Tropics."

These he divided into (a) congenital or hereditary; and (b) acquired.

The congenital diseases dealt with were:—

(1) *Von Recklinghausen's disease;* characterised by (a) multiple tumours under the skin,—molluscum fibrosum: (b) tumours on nerve trunks, and (c) pigmented patches—usually on the back. The presence of any two established the diagnosis. One case had shewn very marked improvement when treated with fibrolysin. Dermatolysis, or elastic skin, was an analogous condition, where there was a condition of diffuse fibroma, hypertrophy, and the skin hangs in pendulous folds: and a remarkable photograph of an old woman suffering from this disease was shewn. It chiefly affects the face, neck and the back of the scalp and is usually incorrectly diagnosed as "elephantiasis." It also shews a hereditary tendency, and the old woman's son was affected with von Recklinghausen's disease and shewed numerous fibromata and neuro-fibromata.

(2) *Adenoma sebaceum,* a symmetrical affection of the face, chiefly involving the naso-labial sulci, the root of the nose and the forehead. It was often congenital, or began early in life, and persisted throughout life. There were three types:—(a) Balzer's type, where the lesions are pale and involve the sebaceous glands; (b) Pringle's type, where the lesions are pink, sebaceous and accompanied by vascular

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hypertrophy; and (c) Hallopeau's type where the lesions are warty, and affect the sebaceous and sweat glands and hair follicles and there is hypertrophy.

(3) *Tricho-epithelioma*, a symmetrical affection of the face, usually affecting the eyelids, forehead, cheek and chin, sometimes however the ears, and more rarely the breasts, anus, and the skin between the scapulæ. The tumours vary in size from that of a pin's head

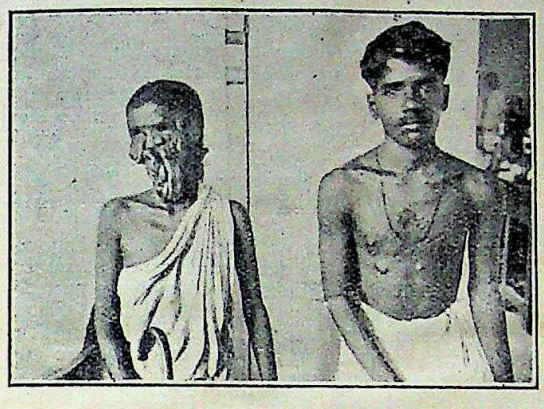

Photo. 1.—*Dermatolysis* of the face. The mother shows fibrous tumours in the skin and nerves, whilst the son is a typical case of von Recklinghausen's disease.

to that of a pea, are whitish, bluish, yellow or pearly in appearance, and on section shew microscopically solid masses of epithelium derived from the rete mucosum and external layer of the hair follicles. This disease is often congenital.

Photo. 2.—*Epidermolysis bullosa*—the disease appeared in infancy—the bullæ form at any point of pressure, *viz.*—most marked at the back of the head, back and sacrum.

(4) *Xerodermia pigmentosum* which does not appear to be hereditary, as the patients rarely survive up to the age of puberty. It commences with freckles and moles, consisting of melanoblasts and angioblasts. These become warty and bleed,—the herald sign of malignant change. They develop into melanotic sarcomata sometimes, more commonly into endotheliomata.

(5) *Epidermolysis bullosa*, usually hereditary. This does not involve the general health, but starts early in life. The patient's skin all over the body becomes so

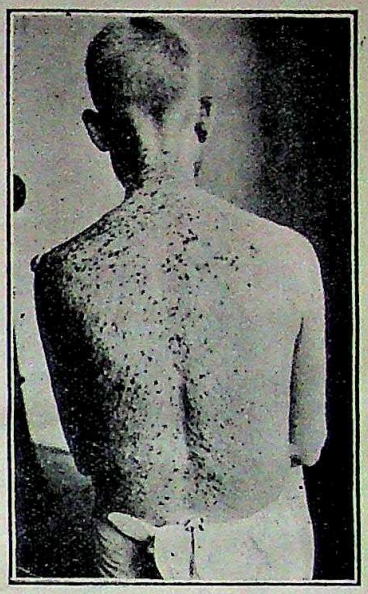

Photo. 3.—*Mycosis fungoides*—in an albino—the dark patches are freckles, whilst the fungating lesion is best seen on the left shoulder.

affected that vesicles and blebs form at any spot subjected to pressure, and are chiefly seen on the finger tips, the wrists, around the neck where the collar band rests, the sacrum, the back of the head, etc. A very

Photo. 4.—*Mycosis fungoides* in a leper—the mycotic lesions are seen on the body as deep crateriform ulcers, the lepra granulomata are seen on the face and ears.

striking photograph of a case was shewn. Two factors are concerned in the disease, congenital irritability of the vascular supply to the skin and loss of elastic tissue.

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Of acquired diseases:—

(1) *Mycosis fungoides* is a chronic malignant disease usually characterised by precursory symptoms of an eruption resembling eczema or exfoliative dermatitis. This is followed by the appearance of pinkish or red tumours, tubercular and nodular and lobulated, or by a flat infiltration. These finally ulcerate or form fungoidal or mushroom-like growths. A very striking photograph was shewn of this disease in an albino, and also of a case of mycosis fungoides in a leper.

(2) *Scleroderma* is a chronic disease characterised by a more or less diffuse, and sometimes pigmented, stiffened and indurated, hide-like condition of the skin. It is usually circumscribed and localized, more rarely

Photo. 5.—*Scleroderma* of both palms, which improved under large doses of thyroid gland.

diffuse. Of the localized types one may recognise (d) sclerodactylia, a disease occurring in the Balearic limbs; (b) a nerve type following nerve distributional areas; (c) types that begin on the neck,—a photograph being shewn of a case of *coll en cuirasse;* and (d) sclerodactylia, a disease occurring in the Bellric Islands.

Morphœa is a circumscribed scleroderma characterised by vascularity and the formation of scar tissue. Photographs were shewn of a case of guttate type and one of hemiatrophica facialis in a Bengali.

In scleroderma good results are often obtained by giving large doses of thyroid extract, *e.g.* 6 grains thrice daily, combined with salicylic ointment, one drachm to the ounce.

Sanitation Supplements to the *Tropical Diseases' Bulletin*, Supplement No. 2, July 1923. Edited by Lt.-Col. W. W. Clemesha, C.I.E., I.M.S.

WE have already drawn attention to these sanitation supplements which are perhaps not so well known as the *Bulletin* itself, but which are of interest to all medical men in the tropics, especially to those more immediately concerned with sanitation duties. The July 1923 supplement contains much of interest. Dr. Andrew Balfour points out the importance of having well trained sanitary inspectors in the tropics and that facilities for educating sanitary inspectors could easily be made available in London. "A century of sanitation" in Brazil is reviewed. During this time yellow fever has disappeared, but malaria and small-pox are still prevalent. There is an interesting review of a paper on "compound sanitation" in East Africa. In camps of African natives pneumonia is a fatal disease and the rate increases with increased aggregation of members. Concrete bunks are advised as lessening contact infection. The shower bath is the best type of bath. Observations on the daily loss of weight in different types of work draw attention to the necessity for good feeding. Oranges and vegetables prevent scurvy but the latter must be carefully cooked.

The health of West-Point is compared in 1909 and 1922. In 1909 there were 96 malaria, 15 cholera infections and 7 typhoid cases. In 1922 there was 1 case of malaria, no enteric, and no cholera infection. The change was brought about by a protected water supply and a sewage system. Under the old system of hand removal, the milkman who sold 80 per cent. of the milk had the contract for cleaning privies during his spare time!

The scheme for child welfare for the colony of Ceylon is outlined and a description given of an interesting experiment in Madras for supplying pasteurised milk in sanitary cans for infant feeding. Those interested in ships will find the reference to ship ventilation of use. Certain cargoes, *e.g.* damp tobacco and vegetables absorb the oxygen of the air in the hold, and cases of asphyxia have thus resulted. The requirements per man for ventilation are discussed. There is an interesting note of a paper on the malaria problem in South Africa especially relating to the employment of white labour in malarial areas. It is considered that it should be the duty of government to supervise all anti-malarial measures and to suggest an economic distribution of population most fitted to each area. Flushing of drains with sea water and systematic quininization of children are considered to be the most effective malarial measures at Dakar in East Africa. In Trinidad drains are made mosquito-proof by being lined with asphalt,—a description and illustrations of the process being given. It would seem to be very successful. Carbon bisulphide added to water in small amounts apparently kills mosquito larvæ without rendering the water unfit for use.

In swampy malarial districts traversed by railways the shaded part of bridges would seem to be the favourite resting place of mosquitoes. Soaking the woodwork and sleepers with creosote has proved a satisfactory repellent in these instances. It can be used for huts also. A full review of Strickland's report on plague operations in Belgaum, 1920, contains much of suggestive interest. Treatment in the off season directed to places as likely to carry over proved distinctly encouraging. Anti-plague measures in Sydney consist in concreting wharf and water fronts and grain stores. Hydrocyanic acid proved an effective raticide and anti-plague serum gave good results in treatment. In Java, government spares no expense to eradicate plague. "The Dutch authorities admit that it may take a long time and a great deal of money, but they refuse absolutely to accept plague as an ordinary feature of their colonial landscape of the 20th century." Interesting studies of rat bionomics in Java and Uganda are given. Rat guards are used to protect food supplies in houses. Expense proved an obstacle however. The importance of contact infection in typhoid is shown by a report from Manila. Referring to Javanese rivers, an author insists that European standards of purity must be insisted on for tropical drinking waters. Reports from Bombay indicate the beneficial effect of piped water supply in reducing dysentery and diarrhœa. Interesting diagrams of "sanitary wells" as advised at Asansol and in Bihar and Orissa are given. A note on Harvey and Christophers' report on vaccination in Java is given. Attenuation of the vaccine virus is prevented by passage through a rabbit, cow and buffalow. Concentrated lymph diluted to 1 in 100 still gives good results—an important point to remember in shortages during epidemics. One linear incision 2 cm. long is made on each

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arm. To laxity of supervision by the Philippine staff after the departure of the Americans is assigned a sudden rise in the small-pox mortality. Cunningham and Cruickshank's method of testing vaccine lymph is described. An illustrated description of Liston and Gore's hydrocyanic acid fumigation for ships is given. Reports from the Chief Medical Officer of Health, Bombay, indicate the enormous importance of room overcrowding in producing infantile mortality. Over 90 per cent. occurs in families living in one room or less. "The neglect of centuries," malaria and trachoma are the greatest problems of Palestine. In Fiji, pupal flies are attacked by a wasp-like insect and it is proposed to utilise this for fly destruction. Reports from French colonies indicate that there is a growing tendency amongst the natives either to go to hospital or to send for qualified assistance at child-birth.

The Editor of the *Bulletin* is apprehensive that detailed card index systems of school inspection in India on European lines may be too top heavy until teachers are properly paid, the school rooms properly ventilated and suitable latrine accommodation provided.

Postural Treatment in Lung Disease, *Brit. Medl. Jl.* 5th May, 1923, p. 7359.

DURING the war Dr. Aitken had charge of the tuberculous ward in a native hospital. Having read of cavities being emptied by posturing, he tilted up the foot of the bed in one case. The ward master noted that not only was the patient better, but that he coughed much less, and asked if he might try posturing in all cases with cough. This was done; the bottles of sedative cough mixture lay untouched, and the ward was quiet in place of being disturbed by a cough here and a cough there as before.

In another hospital a European, who had lain for weeks in bed with a running temperature and signs in the lung of phthisis, was tilted up, and immediately his temperature fell and kept normal. He was going to be discharged, when the temperature rose suddenly. His bed was tilted, and soon after the temperature fell. The tilting was carried out in three-hour stages for a week, and a week later as he felt well he left the hospital and the author lost trace of him.

The patients liked the treatment and would ask to have their beds tilted. The author suggests this treatment in private practice, but an objection raised is that the bed may break.

The Standard Treatment for Malaria.

IN the *New York Medical Journal and Medical Record*, June 20, 1923, Bass discusses the efficacy of the treatment with which his name is associated; this is the standard treatment for malaria. "For the acute attack 10 gr. of quinine sulphate by the mouth three times a day for a period of at least three or four days, to be followed by 10 gr. every night before retiring for a period of eight weeks. For infected persons not having acute symptoms at the time, only the eight weeks treatment is required." Special search has been made for cases in which the treatment failed. Up to the present time not a single case has been found in which fever or chills and fever due to malaria have continued for four days when the patient was taking as much as 30 gr. of quinine daily.

During the past year a further effort has been made to find these so-called resistant cases of malaria by keeping in touch with the cases of malaria in the large hospitals of New Orleans. The date on which the patient began taking quinine and the amount taken were recorded. Any case in which the patient was given as much as 30 gr. of quinine daily and in which the temperature rose above normal on or after the third day was reported for personal investigation. Thus far, only four cases have required investigation.

In one of these tertian parasites had been found and confirmed three days previously: 30 gr. of quinine sulphate had been given daily for four days and the patient had a temperature of 104°F. Investigation revealed some delirium, rose spots on the abdomen, a positive Widal reaction, and typhoid bacilli grew in the blood culture.

In two other cases it was found upon investigation that the nurse had recorded the quinine as being given, but one patient had actually received only one dose of 10 gr. and the other patient only two doses at the time of investigation of the supposed failure of the treatment. They were then given 30 gr. of quinine daily and the temperature did not rise above normal in either of the cases.

The fourth case was one in which the diagnosis was made on one doubtful parasite found in one of many blood examinations. The patient continued to have irregular chills and fever for several weeks although she was given as much as 50 to 60 grs. of quinine daily for several days at a time. The chills and fever finally stopped without a diagnosis being made. It was not malaria.

Bass concludes that so far as his own experience and observations go, the standard treatment is 100 per cent. effective in controlling the clinical symptoms of malaria. The question of absolute cure is not discussed, only that of relief of symptoms. (*Jour. of Trop. Med. & Hygiene*, Augt. 15, 1923, p. 270).

The Wellcome Bureau of Scientific Research.

MANY of our readers will read with interest the following announcement which reached us by the home mail of the 7th of September, 1923:—

"Dr. Andrew Balfour, C.B., C.M.G., F.R.C.P.E., for the past ten years Director-in-Chief of the Wellcome Bureau of Scientific Research, London, resigns that position on October 31st, 1923. Subsequent to this date his address will be c/o Royal Society of Tropical Medicine and Hygiene, 11, Chandos Street, Cavendish Square, London, W. 1.

"He will be succeeded by Dr. C. M. Wenyon, C.M.G., C.B.E., M.B., B.SC., who for the past nine years has been Director of Research in the Tropics at the Wellcome Bureau of Scientific Research, and has now been appointed Director-in-Chief of that Institution."

Dr. Balfour's excellent work at the Khartoum Institute was succeeded by his even more vigorous work at the London Bureau. Under his direction that Bureau has collected together a museum of tropical diseases which is an education in itself: whilst the *Tropical Diseases Bulletin*, published monthly, together with its quarterly *Sanitation Supplements*, has become a journal which no medical man practising in the tropics can possibly afford to be without, since nowhere else can he obtain a connected résumé of all the more important advances in tropical medicine and hygiene put together in small compass and so indexed as to afford easy reference. We trust that Dr. Balfour's resignation is but the prelude to his appointment to an even more important post.*

No person could possibly be more suitable than Dr. Wenyon to succeed Dr. Balfour. His work in tropical medicine and especially during the war has rightly earned for him a world-wide reputation, and his selection represents that of the right man for the right appointment—a principle too often ignored in official matters.

We trust that such of our readers as go home on leave and have occasion to pass through London will not neglect to visit the Wellcome Bureau at 25-27, Endsleigh

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* As we go to the press we hear the gratifying news that Dr. Balfour has been appointed Director of the new School of Hygiene in London.

We heartily congratulate Dr. Balfour on this well deserved appointment. The School is indeed fortunate having secured so capable a pilot.

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Gardens, Gordon Square, N. W. 1. Those who go through the museum will find in it a wealth of instructive information splendidly arranged, whilst it is of great importance for the medical profession in India to keep in touch with the body of workers at home upon tropical diseases, and mutual interchange of views and of experience is always helpful.

A One-Day Treatment for Scabies.

IN the April 1923 number of the *Journal of the Naval Medical Service*, p. 146, Surgeon Captain J. F. Hall describes a one-day treatment of scabies, modified from a method in use in the Danish Navy. The technique is as follows:—

(1) 2½ lb. of sulphur sublim, are dissolved at a gentle heat in 5 lb. of an aqueous solution of caustic soda containing 1¾ lb. of this alkali. This makes a clear solution.

(2) 4½ lb. of vaseline and 4½ lb. of anhydrous lanoline are carefully mixed in a warm mortar, and to this mixture the 7½ lb. of sulphur solution in soda lye are added.

(3) Fresh zinc hydroxide is prepared by mixing 9 oz. of zinc sulphate and 12½ oz. of a 20 per cent. solution of caustic soda; this is afterwards added to the ointment, which is then made up to a total weight of 20 lb. by the addition of liq. paraffin.

(4) About 3 drm. of essential oil of almonds are added to disguise the odour.

Method of Application.—The patient has a thorough hot bath, dries himself, and rubs the ointment well into the affected parts and their neighbourhood; if the back is affected this is rubbed by an assistant. The patient then stands with his body exposed for fifteen minutes to allow of the escape of the sulphuretted hydrogen which is generated by the application of the ointment to the skin. He then puts on a shirt or pyjamas and goes to bed, where he remains for twenty-four hours, then he has another bath, puts on clean clothes, and he is cured.

In none of the author's cases has any dermatitis developed, or any ill effects been seen from the sulphuretted hydrogen, and there have been no relapses when the treatment has been thoroughly carried out, though hard rubbing is not necessary.

In any of H. M. ships fitted with a sterilizer capable of disinfecting clothing and bedding this treatment can be easily carried out, and so save the necessity of sending cases of scabies to hospital.

This ointment keeps well.

Epilepsy and Luminal.

IN an article on Recent Work on Nervous Diseases in the April 1923 Number of the *Practitioner*, Dr. Campbell Thomson discusses the treatment of epilepsy by luminal. He refers to the results of treatment in 125 cases, observed over periods of not less than eighteen months. All these patients had previously been treated with bromides over periods varying from fourteen years to six months, and, as it is well known that omission of bromides is sometimes followed by temporary improvement, the treatment was suspended for a time before the luminal was given. That improvement could not, however, be attributed to omission of bromides in these cases was clearly shown by the fact that in only one instance was there a period of remission after omission of bromides, and that remission lasted only for sixteen days. Two cases showed no alteration when the bromides were omitted, and in all the others the malady became more severe.

A study of the results showed that out of the total number of 125 cases, 36 were either not improved or deteriorated under the treatment, whilst the remainder did better with luminal than with bromide. The patients who showed most improvement were those in whom the fits occurred at frequent intervals, while the least affected were those in whom the attacks occurred in bouts at considerable intervals of time.

According to Dr. Golla, luminal may be found to be particularly useful in a class of case which does not respond to bromide.

It was found that, as a rule, the drug was well tolerated, and most patients found they were brighter and more cheerful after changing the bromide for the luminal. In twelve instances, however, there were complaints of giddiness and drowsiness, and five of these twelve developed a slightly reeling gait. By diminishing the dose toleration was obtained in all except four patients, who complained so persistently of giddiness that the treatment was stopped.

There was in no case any sign of development of a drug habit, and suspension of treatment did not give rise to any disturbance.

The usual dose given is from ½ to 1 grain night and morning, or a single dose of 1 or 2 grains can be given at night. When larger amounts are given it is advisable to keep the patients under frequent observation.

Luminal in Migraine.—The successful treatment with luminal of some cases of epilepsy which do not respond to bromides led Dr. Wilfred Harris to try the effects of the drug on patients subject to obstinate and frequent attacks of migraine, with the result that both the frequency and the severity of the attacks were greatly reduced. Dr. Harris recommends that, as a rule, the dose should not be more than three-quarters of a grain three times a day. If the result is beneficial, this amount need not be increased, but after a fortnight it may be reduced to twice daily, and later on to one dose daily taken at bed-time.

Reviews.

ADDRESSES AND PAPERS.—Dedication Ceremonies and Medical Conference, Peking Union Medical College, September 15th to 22nd, 1921. Rumford Press, Concord, New Hampshire. Pp. 416.

THE medical worker in India into whose hands this lavishly illustrated and sumptuously published collection of addresses and papers falls may well rub his eyes. This is medical education as it ought to be endowed, not as it is left to struggle with parsimonious grants and exiguous means in the "land of regrets." The interest of the Rockefeller Foundation in China dates from 1908, when the first commission was sent out from the University of Chicago to report to the parent foundation in New York. The report of a second commission in 1914 was followed by the establishment of the China Medical Board in 1915, and a third commission recommended the establishment of two medical schools and the encouragement of medical education in China as the most hopeful line of policy to be pursued. It was felt that, whilst the numerous and well organised missionary and private hospitals afforded every facility for medical work and study of the highest order, the supply of Chinese medical men with the requisitely high degree of training was inadequate.

The Union Medical College was first established by the activities of the London Missionary Society and other kindred organisations in 1906. The present group of new buildings cover 22.6 acres and consist of 14 separate buildings: the illustrations in this volume alone conveying to the reader how admirably thorough and fully up-to-date is the construction and equipment throughout. Pre-graduate, post-graduate and short term revision classes are fully provided for: and in an opening address by Mr. John D. Rockefeller, Jnr., the reader will find a splendid account of the ideals and the aims of the institution: "it is the desire of the Peking Union Medical College to offer to the people of China the best that is known to Western civilization not only in medical science but also in mental development and spiritual culture.... Rome

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was not built in a day, nor can the ideals which animated the founders of the College be realised in a day or a year or a decade. The most stable and enduring structure is that which is built on deep and broad foundations.... Gradual growth alone gives assurance of stability and permanence..... When men of the requisite calibre are each year being graduated from the college to spread abroad throughout this great land the healing of the body and the inspiration of the soul of the Chinese people, the spirit of service and of sacrifice in which this institution was conceived will have been immortalised, and one of the chief purposes for which the college was founded will have been realised." The medical worker in India, envious though he may well be of such opportunities and such splendid facilities, will welcome this splendid addition to the medical education institutions of the East.

In addition to opening addresses, however, the volume contains the papers read at the subsequent medical conference which lasted for a week. Here there is much of special interest and importance to the Indian worker. Dr. Hume's account of medical education in China, "a survey and a forecast," will find many an echo in India: "Chemistry facilities are scanty, there is no proper apparatus for teaching physiology, 3,000 physicians minister to the needs of a population of not less than 360,000,000 : not by increasing the number of dispensaries where the foreigner can treat the sick himself will China be benefited, but by an increased effort to train Chinese physicians, men and women, themselves to minister to their fellow-countrymen and women ... the first issue is sufficient staff and funds, the second that of sufficiently high standards. .... The future of medicine must be in Chinese hands ....only schools with high professional standards should be countenanced."

Of many excellent papers Dr. A. B. Macallum's "Biochemistry in Retrospect and Prospect" adumbrates the future hopes of this new yet immensely important branch of medicine and shews the splendid facilities for its study provided at Peking. Dr. S. S. Goldwater's address on "The Ideal in Hospital Organisation" is one of special interest to Indian workers ; Dr. Victor G. Heiser in an admirable address explains how anti-hookworm campaigns help to arouse a sanitary conscience and an interest in public health measures among an Eastern population. The anti-hookworm campaigns of the Rockefeller Foundation do not merely aim at eradicating hookworm infection : they succeed in arousing popular interest in general measures of public health.

A fully illustrated and exceptionally interesting paper is that by Dr. G. E. de Schweinitz on "The Evolution of some of the Visual Phenomena of Pituitary Body Disorders :" 45 per cent. of patients had practically or entirely lost the sight of one eye before the true nature of the lesions was identified. Dr. Wu Lien Teh deals with epidemic plague as it occurs in Manchuria, giving a full account of the history of the disease in Manchuria, and laying special emphasis on human carriers, *i.e.*, apparently healthy persons who harbour *B. pestis* in their sputa. He failed to find natural infection in marmots, but succeeded in infecting them by inhalation of sprayed cultures. Pneumonic epidemics he considers to be secondary manifestations of bubonic plague, whilst the prevalence of septicaemic cases is often noted towards the termination of an epidemic. Disinfectants for use on infective sputa have disappointing results, and the mask was found to be the best means of personal protection.

A paper by Dr. Florence R. Sabin on "The Origin of the Blood Cells" is one of interest to all pathologists, whilst Dr. Sahachiro Hata deals with "The Present Status and Future Problems of Chemotherapy," a paper which will command general interest because of its authoritative character. In the clinical section short symposia on kala-azar, sprue and tuberculosis as they occur in China deserve attention. Sir William Smyly, as visitor to the conference, gave an address on "Eclampsia and Eclampsism," dealing with theories as to its causation and the Rotunda methods of treatment. "Aspects of Parasitology in the Philippines" by Dr. Frank G. Haughwout is a paper which should be read by all laboratory workers : whilst other important papers deal with problems in obstetrics, tetanus as met with in the East—with special reference to the possible occurrence of the *B. tetani* in the intestinal tract,—ophthalmology, neurology and operative surgery.

The whole volume is one which will be read with the greatest interest by medical workers in India. Whilst we envy China the new College, we cannot but feel that its importance and value in the ever widening domain of tropical medicine will become more and more felt as its activities expand with its ever growing programme.

FUCH'S TEXT BOOK OF OPHTHALMOLOGY, 7th, 1923 Edition. Published by the Lippincott Co., Philadelphia and London. Obtainable from Messrs. Butterworth & Co., Calcutta. 997 pp. Price, Rs. 36-12-0.

THIS is the seventh edition of an old and favourite text book, and, although changed a good deal, maintains the high standard of previous editions. It is now based on the 13th German edition, for which Professor Salzmann is responsible, but the translator, Dr. A. Duane, has done a lot of re-arrangement and interpolation, including the whole chapter on motor anomalies of the eyes, which render this volume much more than a mere translation of the German book. As in the previous edition the notes thus interpolated are very valuable and represent up-to-date English and American practice.

The most marked change in the new edition is its radical re-arrangement, the book starting with a systematic account of the anatomy and physiology of the eye, followed by a short account of the etiology, symptomatology, and general therapeutics of eye diseases, refraction in theory and practice, the general examination of the eye, and determination of sensory and motor defects,—this occupying 364 out of 950 pages, and furnishing a very sound basis for the detailed study of diseases in the different regions of the eye which occupy the next 550 pages.

The last 110 pages of the book are devoted to operative procedures, and this part, which used to be the weakest in the book, is now quite good and contains a useful account of modern operative procedures, especially those which deal with the lids and socket and those for glaucoma.

Former editions were weak in the brief accounts which they gave of treatment, operative and otherwise, whilst good as regards pathology and diagnosis, and this edition, whilst very carefully altered and up-to-date in these last, is much more evenly balanced than before, and the systematic treatment of anatomy and physiology in one section, instead of in a series of scattered paragraphs, is a great improvement.

English work is freely recognised and quoted to a far greater extent than in previous editions, a pleasing change from the pre-war German textbook, which was slow to recognise any but German research.

After this note on its contents, it is hardly necessary to point out that this volume is one which should find its place in every ophthalmological library.

AIDS TO OPERATIVE DENTISTRY.—BY J. D. HAMILTON JAMIESON, H. D. D., L. D. S., London: Baillière, Tindall & Cox, 1923. pp. 168. Price, 3s. 6d. net.

As the author states in his preface the manipulative portion of operative dentistry can only be learnt at the chair side, but in this very useful little book there is much that will be of great use to the dental student.

In many ways it is a résumé of the methods of teaching employed at the Edinburgh Dental School.

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The chapter dealing with extraction can be thoroughly recommended and it might even be very useful to medical practitioners who have a certain amount of tooth-extracting to do.

The language employed is simple and the book easily readable.

DISEASES OF THE SKIN.—By ROBERT W. McKENNA. Baillière, Tindall and Cox., pp. 460, plates 160. Price, 21s. net.

THIS addition to the existing large number of books on diseases of the skin is written with a special view to the needs of the medical student and the general practitioner.

It is an excellent book and in some respects is an advance on existing textbooks. The illustrations are exceptionally good and the number of prescriptions has been kept within more reasonable limits than is usual in books on skin diseases.

It will be found useful for the advanced student and for the medical man who desires to keep his knowledge up-to-date, but in view of the already overcrowded state of the medical curriculum it is doubtful whether it is not too large for the average student. It is also too small to serve as a book of reference.

A pleasing feature of the book is that its price is moderate as compared with recent textbooks which are equally well illustrated. Evidently the cost of publishing has fallen in a gratifying manner, as of late the cost of English and American textbooks has been excessive, but is now obviously coming down.

THE SURGICAL DISEASES OF CHILDREN. A Handbook for Students and Practitioners.—By F. C. PYBUS, M.S., F.R.C.S., Assistant Surgeon, Royal Victoria Infirmary. H. K. Lewis & Co., London, 1922. Pp. 408. Price, 18s.

THIS book does not claim to be a complete treatise on the subject, but " is rather a record of personal experience of the common conditions met with on the surgical side of a children's hospital." There are many illustrations, mainly photographic.

In our opinion there is a need for expansion, if this book is to become really useful; the information contained in this edition is very little more than can be found in the ordinary surgical textbook. It will be useful for students wishing to make a rapid review of children's surgery before attending the wards of a hospital for sick children.

DENTAL SURGERY FOR MEDICAL PRACTITIONERS. By J. J. MODI, L.M. & S. (Bom.), L.D.S. (Eng.), 1923. Karnatak Printing Press, Bombay. Pp. 199. Price, Rs. 5.

THIS compact and useful little volume which, as the author states is more a compilation from other books and articles than an original work, should be very helpful to any medical practitioner who desires some general knowledge of dental surgery.

There are one or two small corrections which would be desirable in the opinion of the reviewer. On page 46 the author gives pus as one of the constituents of tartar. It is true that pus and food debris collect round tartar but the latter in the first place is purely a deposit of lime salts from saliva.

On pp. 56 and 57 he states that the carbohydrate eating Indians are freer from caries than meat-eating Europeans. This may be true, but it is not the meat portion of European diet that causes caries, but the various other patent and manufactured foods that they eat. On the other hand the tremendous prevalence of pyorrhœa among Indians is largely due to the soft nature of their diet.

On page 62 he advises the use of a hard brush and gritty powder in tooth-cleansing. This is entirely wrong and ought to be avoided. All that is required is a medium brush and if anything in the nature of a cleanser is required, it should be in the form of a paste or mouth wash.

The author also advises medical men to stop short at palliative treatment and leave legitimate dental work to the dental surgeon. This is a very sound idea in places where a dental surgeon is easily available, but as there are so many parts of India many miles from a dental surgeon it is essential that the medical officer should have a knowledge of simple filling of teeth. Lastly with regard to extraction, it is better that any operator should work with as few forceps as possible and it is advisable for him to learn to work with only one pair for the upper jaw and one for the lower; *e.g.*, for the upper, those described by the author for use in extracting upper incisor teeth, and for the lower, those described for use on lower incisor teeth.

With regard to the position of the gag in extraction under nitrous oxide gas, on p. 140, the author says that dislocation of a tooth is often due to the gag being placed too far in front of the mouth. There is only one place for the gag and that is right in front of the mouth. It will also be found much easier to extract left lower molars and pre-molars from the left side of the chair.

THE HOME AND HEALTH IN INDIA AND THE TROPICAL CLIMATES. By Dr. KATE PLATT, M.D., B.S. (Lond.) Baillière, Tindall & Cox, London, 1923. Price, 5s. net. Pp. 216.

THE author was for many years Principal of the Lady Hardinge College and Hospital at Delhi. This book is especially written for European women who have to make their homes in the tropics.

Dr. Platt has successfully embodied her medical knowledge with the results of her observation and experience in India and the book will be found very useful, especially to new comers and should be carefully studied before leaving home. The chapter on the preparation and outfit necessary on proceeding to the tropics seems particularly practical and helpful and should help to avoid many of the mistakes and pitfalls which would appear to be made year after year. A good description of the bungalow, its arrangement and management is given with much helpful advice. If we would make a criticism of this part it would be that the importance of personal supervision is hardly emphasised sufficiently. As the author points out, Indian servants, though extraordinarily good in many ways, do not understand or appreciate European standards of cleanliness, and continuous personal supervision is necessary. Thus it is not enough to advise that under certain circumstances all milk and drinking water should be boiled; the lady of the house must see personally that it *is* boiled and not only heated; and afterwards it should be carefully protected from all sources of contamination as contaminated boiled milk and water are more dangerous than when unboiled. Also the importance of the cleanliness of *jharans* is not insisted on strongly enough. The giving out of these should be a daily duty and not done at odd intervals. The importance of the care of the mother's health during the pre-natal period is pointed out and much useful advice given; while the young mother will find much valuable help in the chapters devoted to the child's development, its illnesses, their prevention and emergency treatment. The part devoted to tropical diseases is somewhat sketchy but the object of the book perhaps makes this inevitable. Simple descriptions of the ordinary diseases are given with emergency treatment.

The book is of a convenient size, well printed and bound, is written in a good and an interesting style, and we recommend it heartily to those for whom it is written. It should find a place in the household "medical cupboard" along with the others which the author recommends.

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ANNUAL REPORTS.

THE PASTEUR INSTITUTE OF SOUTHERN INDIA, COONOOR. ANNUAL REPORT FOR THE YEAR ENDING 28TH FEBRUARY 1923, MADRAS, SUPERINTENDENT, GOVERNMENT PRINTING.

THIS report, by Lt.-Colonel J. W. Cornwall, M.A., M.D., D.P.H., I.M.S., strikes a new note and heralds a new departure. The total number of patients fully treated at Coonoor during the year was 3,375 or a *decrease* of 96 on the total for the previous year. The reason was the gradual introduction of the scheme for the issue of antirabic vaccine to Government headquarter hospitals in the Presidency.

[Civil surgeons and harassed practitioners throughout India have for many years clamoured for the distribution of antirabic vaccine, in place of having to send patients to selected centres in the hills for the treatment. In Madras at least this is now being experimented with, and, we need hardly add that under so experienced a head of an antirabic institute as Colonel Cornwall, this is being done only tentatively, with all due precautions, and with all necessary controls. Such a policy *must* constitute the first step towards any release of the carbolised vaccine for general use. The whole question, indeed, of the future antirabic policy in India demands most careful attention to-day: the gravest doubts have been cast upon the true degree of efficacy of all antirabic vaccination; the public and the Local Governments are demanding that the large sums of money spent upon sending patients to institutes in the hills shall be saved; the public health worker who views matters in true perspective realises that, however dreadful a disease be hydrophobia, it does *not* constitute a disease of any real importance in Indian mortality rates: the medical research worker considers that with the advent of Semple's carbolised vaccine we have reached what must at present constitute at least the safest line of antirabic vaccination; whilst the cardinal problem of all remains in the future discovery of the still unknown micro-organism of rabies, knowledge without which our antirabic measures still largely consist of working in the dark. But such a position can be solved only by careful and clear thinking and by very careful investigation and planning. Any measures taken in a hurry will be regretted later, and the time is not ripe for any drastic changes.]

With regard to the patients treated at the Institute the report follows the usual lines. Advice but no treatment was given to 171 persons. There were 25 deaths and a total hydrophobia rate of 0.74 per cent. with a failure rate of only 0.35 per cent.,—(12 deaths). With the vaccine issued to Government headquarter hospitals 1,248 persons were treated with a total of 9 deaths, a total death rate of 0.72 per cent., and a failure rate of 0.32 per cent.

The correspondence of these two sets of figures appears to indicate that the treatment is as efficacious, *when properly administered in institutions*, as when used at the parent Pasteur Institute: but it is obvious that were the vaccine to be issued broadcast the chief difficulty would be to persuade patients to come daily for the 14 days' injections; indeed this difficulty has already been experienced at Rangoon and Madras where, amid the surroundings of a city, patients are less amenable to discipline.

It is as yet too soon to pass any verdict upon the results of this most interesting experiment. If the numbers treated at both Coonoor and other institutions be added together then no less than 4,623 patients were treated during the year, an enormous increase on the figure of 3,471 for 1921-22.

Of the other two main features of interest in this report one is the position of jackal bite in the returns; they constitute for the past 15 years only 2.74 per cent. of the patients treated at Coonoor, as against some 22 per cent. of those treated at Shillong.

["Dog-bite" in India may in fact mean anything, from a lick upon unabraded skin by a non-rabid animal to a severe injury inflicted by an unquestionably rabid animal: whereas unprovoked jackal bite is almost always indicative of real exposure to the risk of hydrophobia. Hence jackal bite becomes one of the many important points which differentiate the Indian from the European institutes. A second, and even more important is that, since Lt.-Colonel W. F. Harvey first introduced the keeping of accurate statistical details into antirabic work at the Kasauli institute, and Indian institutes commenced to publish not merely failure rates—*i.e.* only such deaths as occurred later than 15 days after the expiry of treatment,—but also the total number of deaths from hydrophobia and probably the only *full and honest statistics* available in the world, there has now accumulated in India a mass of statistical information which well deserves detailed and expert scrutiny and analysis. No other country in the world, we believe, can furnish anything of the sort.]

The other important feature in this, as in all the Coonoor reports is its collection of statistics with regard to the mortality from rabies. In the last ten years of 812 persons bitten by undoubtedly rabid animals and treated the total death rate was 2.9 per cent., whereas of 1,362 corresponding persons bitten and not treated the rate was 6.2 per cent. Taking the risk run by persons bitten by undoubtedly rabid and unquestionably infective animals,—(as shewn by at least one death from hydrophobia having occurred among each group of persons so bitten),—and Table IV, of 423 persons so bitten 278 remained untreated with 148 deaths, or a hydrophobia mortality of 32.8 per cent. This, of course, would seem to shew immediately the immense effect of the treatment in saving life, but a word of caution is necessary. Death from hydrophobia after the bite of a rabid animal may occur at any period from the third to the 50th week after bite or even later, but the peak of the curve of frequency is at its maximal about the 6th week, or 42nd day after bite. Most of these patients in this table do not come for treatment until the death of one or more of those bitten has alarmed them; and most of them again have thus passed the period of maximal risk. Hence the figures, as Colonel Cornwall points out, are not unselected.

This brief report contains within it much food for careful reflection. The whole antirabic question in India is at present a most difficult one. Fortunately however there are at present at the head of the different antirabic institutes of India a group of careful and very thorough workers who can be trusted to think wisely and to plan well. So far from a universal distribution of the vaccine being resorted to, we consider that the Madras policy of controlled and careful distribution only to headquarter hospitals, with a collection of results is the policy which should at present be advocated. In other words we consider that the treatment should at present remain institutional, although the necessity for hill-station treatment has long ago gone by the board with the introduction of the carbolised antigen of Sir David Semple.

KING EDWARD VII MEMORIAL PASTEUR INSTITUTE, SHILLONG. ANNUAL REPORT FOR 1922, SHILLONG. GOVT. PRESS, ASSAM. PRICE, 12 ANNAS.

DURING 1922 Lt.-Colonel F. P. Mackie, I.M.S., was Director of the Shillong institute till January 30th. Lieut. E. C. R. Fox, I.M.D., officiated from January 31st to May 15th, when Major H. E. Shortt, I.M.S. took over charge. A total of 1,728 persons completed the course of antirabic treatment, of whom 115 were Europeans. This represents a slight falling off on the 1921 figures, probably owing to the abnormal floods of 1922 when traffic on the E. B. Ry. was closed for nearly a month. There were no deaths from hydrophobia among the European patients, and in the case of Indians, the total hydrophobia rate was 0.80 per cent. and the failure rate only 0.18 per cent.: a very low figure when it is noted that

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jackal bites constitute no less than 22 per cent. of the cases treated at Shillong. 51 per cent. of the patients came from Bengal.

With regard to research work, Major Shortt notes first on the pathology of acute experimental kala-azar in monkeys. Attempts were made to test the infectivity of the fæces and of the drinking water in kala-azar, to find either a vertebrate or invertebrate animal truly susceptible to infection, and to infect animals by the cultural phase of *L. donovani*, by body lice, by bed bug excreta, and by the natural herpetomonads of insects. As is usual in experimental work on kala-azar, an enormous amount of experimental work led to but few positive results. In treatment Major Shortt emphasises the value of urea stibamine, and his results with this compound have already been published in our number for last July. The factors which cause the undue prevalence of malaria in Shillong were under investigation, and as published in our September issue—the problem of diphtheria in the European schools in Shillong, which had been a constant menace since 1917, was most successfully dealt with. The vaccine section of the institute ceased to manufacture its own supplies during the year and became a distributing centre for vaccines purchased from the Central Research Institute, Kasauli. The total cost of running the institute during the financial year 1922-23 was Rs. 64,988 of which Rs. 7,067 was found by public and private subscriptions and the balance from provincial revenues.

REPORT OF THE BURMA PASTEUR INSTITUTE, RANGOON, FOR THE YEAR ENDING 31ST MARCH, 1923. BY LT.-COLONEL T. H. GLOSTER, M.B., D.P.H., I.M.S. OBTAINABLE FROM THE SUPERINTENDENT, GOVERNMENT PRINTING, BURMA. PRICE 8 ANNAS.

THE Burma Pasteur Institute combines the functions of both an antirabic institution and the provincial bacteriological laboratory. During the year 1922-23 the total number of persons who attended was 1,107, an increase of 24 per cent. on the figures for the previous year. In the case of 42 patients treatment was discontinued when evidence became available that the biting animal was not rabid: 421 persons were advised that treatment was not necessary—a fact which very clearly emphasises the large numbers of patients who flock to the Pasteur institutes of India unnecessarily,—and 99 persons voluntarily abandoned treatment. The number fully treated, was thus 545.

Of these 42 per cent. came from outside districts, 16 per cent. were bitten by animals proved rabid by laboratory tests, and dogs were responsible for biting 675 out of 686 cases at risk. There was only one case of jackal bite and this was in a patient from outside Burma. Of over 5,000 persons who have come to the Rangoon institute for treatment since 1915 not one has been bitten (in Burma) by a jackal. This special freedom from jackal bite,—which is responsible for the majority of all cases of hydrophobia in treated patients,—is contrasted with the figures for Kasauli, 17 per cent. of 39,914 patients; for Shillong, 27.5 per cent. of 10,084 cases; and for Coonoor, 2.5 per cent of 22,053 cases bitten by rabid jackals. Jackals are extremely rare,—if indeed they are present—in Burma, and this very important factor in swelling the hydrophobia returns is absent from the Rangoon institute, which accordingly presents figures more akin to those for European institutes than those for Shillong and Kasauli. The total death rate for the Rangoon institute in the year under review was 0.41 per cent., and the failure rate 0.22 per cent. The reply-paid postcard system of following up the after-history of patients worked fairly well, 554 replies being received out of 614 enquiries sent out. On the other hand of 85 persons reported as having been bitten by rabid animals but not treated, the after-histories of 54 could not be traced, 23 were reported as alive and in good health three months after having been bitten, and 8 had died from hydrophobia:—figures which go to still further emphasise the fact that the death rate from hydrophobia among untreated cases is, probably, very much less than is usually supposed to be the case.

In the Bacteriological Section there were 3,016 examinations carried out, an increase of 28 per cent. on the previous year. 450 autogenous vaccines were prepared. The issue of antisera from stock in cold storage shewed a considerable increase over the previous year. Lt.-Colonel J. C. G. Kunhardt, I.M.S., conducted an enquiry into the causes of the prevalence of enteric fever in Insein Jail. Lt.-Colonel T. H. Gloster, M.B., D.P.H., I.M.S. was Director throughout the year, Lt.-Colonel J. C. G. Kunhardt, I.M.S. acted as Assistant Director until the 25th March 1923, and Major J. Taylor, D.S.O., M.D., D.P.H., I.M.S., subsequently. Military Assistant Surgeon G. H. Blaker, I.M.D., was Assistant to the Director, Mr. P. N. Rao Naidu, bacteriological assistant, and Drs. K. N. Menon, L.M.P., and J. Venkataramana Naidu, L.M.P., were also on the staff.

REPORT ON THE PUBLIC HEALTH ADMINISTRATION OF BURMA FOR 1922, RANGOON. SUPERINTENDENT, GOVT. PRINTING, BURMA. 78 pp. PRICE Re. 1-12.

DURING the year the post of Director of Public Health, Burma, was held by Lt.-Colonel C. E. Williams, I.M.S., whose retirement after 15 years of most strenuous work for the promotion of the physical well-being of the people of Burma is deplored in this report, which is by Lt.-Colonel E. Bisset, I.M.S., formerly Assistant Director, and now Officiating Director. And we may add that Colonel Bissett's report is one of very real interest to all interested in public health problems in India.

The 1921 census shews that the total population of Burma is 13,212,192 spread over an area of 233,707 square miles and registration of vital statistics is now compulsory over practically the entire area, legislation having gradually extended the area concerned from urban to rural districts. Yet, at present, where do we stand with regard to such registration, which must form the basis of most public health work in a community? "Several generations must pass," writes Colonel Bisset "before a primitive people can be expected to appreciate the economic importance of accurate vital statistics. For many years the process of collection must be regarded largely as an educational measure, and deductions of only a very general nature are to be made from the figures collected": and he goes on to point out that at the 1910 census in the United States the registration area only covered 59 per cent. of the total population, whilst in 1921 Rosenau claims that in the U. S. A. people as a whole have not yet become accustomed to the registration of births. There are three standards of registration in Burma: (a) full registration with every detail as to the cause of death: (b) limited registration requiring the actual numbers of births and deaths, and with particulars of sex and in the case of death the age at death: (c) a still more limited form of registration requiring only particulars of the total number of births and deaths. And that Burma is really tackling the problem is shewn on page 3 of this report where there is outlined a unique and novel method of using tallies for an illiterate population. Bamboo splits are used for both each birth and each death. For males the bits of bamboo are pointed at one end, for females they are notched: for births short splits of an inch, and for deaths longer ones of 1½ inches are used. For births the month in which the birth took place is recorded by notches cut into the edge, thus a birth in June requires six notches: for deaths the age of the person is recorded by a notch cut into the decade concerned, and the month by notches cut at the bottom of the bamboo. Everyone in India interested in public health matters would do well to consult the original report, for here is a most suggestive and ingenious method suitable for an illiterate population. In general, and in this report especially, we find emphasised that, whilst the registration of births tends to be entirely neglected, the registration of deaths is far more accurate,—inasmuch as

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legal regulations require it before the body is disposed of. In villages probably not more than two-thirds of the deaths are recorded, but in towns very few escape registration. "The root of the trouble is that there is no incentive to birth registration. A birth certificate is of no value to a child nor a death certificate to the surviving relatives. It may be possible in future years however to devise some means of making these documents of legal value." Successful vaccination of a population of course depends on accurate birth registration, also an accurate information about infant mortality is to the public health officer what a clinical thermometer is to the physician. Probably the actual birth rate in general for Burma is somewhere in the neighbourhood of 50 per mille, yet different areas register figures varying from 14 to 58 per mille. The result is that when a census comes to be held the most glaring discrepancies become visible: in areas and provinces where, during the decade, the recorded deaths have been in excess of the recorded births, it is found that the population has actually increased.

A few civil surgeons are specifically mentioned as having taken considerable trouble to check the registers: more however are noted as having neglected the matter: whilst the few fines imposed hardly affect the issue. "In Yamethin 425 omissions of births and only 4 omissions of deaths were detected during the year," whilst under orders from the Deputy Commissioner the birth register of every village which returns a birth rate below 16 per 100 houses is inspected. The results are of interest:—"In Amherst district the headmen of 13 villages were found not to be in possession of birth registers. .... In some villages the birth and death registers were very carelessly handled, pages torn out or lost, various columns either not filled in or wrongly entered." The Deputy Commissioner of Pegu, having investigated matters, found that the township officer and the police agency blamed each other, and has now fixed the responsibility on the head clerk of the township office. Other Deputy Commissioners are following suit.

Turning to other matters, Colonel Bisset notes that the figures for Burma do not bear out Dr. Bentley's claim of a negative correlation between death rates and food prices. The birth rate for the Province as a whole was 29.69, and the urban birth rates were in some instances so low,—*e.g.* 14.41 for Syriam—that special investigations were called for, and shewed that the main reason was defective registration: the corrected figure for Syriam should have been 31.85. In no less than 13 big towns with a population of over 10,000 no still births were recorded, a state of things which it is impossible to believe. The provincial death rate was 22.23. Here, although the general registration is better, the diagnosis as to cause of death usually rests upon very little evidence. The infantile mortality rate for the Province was 174.49: and in Sandoway District, which returned the highest rate there were 2,991 deaths, of which 1,382 were from fever and no less than 1,045 deaths in infants. The Deputy Commissioner writes "I say to every Burman I meet—Sanitation means the saving of your country. Public opinion has long been apathetic towards all but the most primitive sanitary principles, but if a national feeling can be aroused by fixing popular attention on the connection between sanitation and their very existence, if infant mortality can be illustrated in its causes and effects, more might be accomplished in a year than has been done by the bye-laws of a century." True remarks, yet the only interest which certain political orators in the country take in public health measures is to try and persuade people not to be inoculated when plague is rife!

The returns for urban infant mortality are unreliable *in toto*. "Unless municipal committees take up the matter seriously nothing can be done." The bye-laws are there, but they remain a dead letter. In Mandalay, Dr. Mullan, Medical Officer of Health, has done excellent work in checking and ensuring the accuracy of registers: and here the figures are of interest. In three years, as the total number of births recorded rose from 4,768 to 6,406, the infant mortality figures fell from 490 to 305. Infant welfare societies are at work in Rangoon, Moulmein, Taunggyi and Meiktila, and the British Red Cross Society central organisation, which had lapsed after the war, has now been resuscitated on a different basis for peace time duties.

Cholera shewed an increase on 1921 of 1,256 more deaths,—5,047 deaths in all. Prome was especially attacked, at first in the district areas, later in Prome itself. In the latter, with cholera prevalent in the district, with a large festival in prospect which was certain to be attended by several infected persons from the district, the pump and general water supply from the water works was known to be defective, yet no steps at all appear to have been taken to cope with an obviously dangerous situation: whilst, despite the protests of the Health Officer, the conservancy staff were reduced by 19. The result was a severe outbreak, starting with the festival at the end of October and carrying on to December. At Bassein an outbreak occurred among Ooriya coolies employed at a mill, panic seized the coolies who scattered all through the town, and 234 deaths occurred.

Small-pox was also on the increase in 1922 with a total of 1,439 deaths. 68 per cent. of it occurred in rural areas, and the Southern Shan States were more heavily infected than before. In Magwe District there was an extremely severe outbreak which continued to rage at the end of the year. The vaccination supervisor was found to be suffering from venereal disease, to have avoided travelling as much as possible, and to have faked the registers and his diary. He was dismissed. Both here and in the other epidemic areas special measures had to be taken and extra personnel employed, and wholesale vaccination has been pushed.

Plague accounted for 7,282 deaths, an increase of nearly 2,000 on 1921. It chiefly affected the urban areas. The outbreak in Meiktila district was a continuation of that from 1921. A specially trained and additional sub-assistant-surgeon was sent to assist the civil surgeon, here the people are taking to inoculation. In Pyinmana the hard work and success of Dr. Basu, the civil surgeon, and of Dr. J. C. Pillay, are especially mentioned in this connection. In Lower Chindwin political agitators got hold of the people, preaching a campaign against anti-plague inoculation. One of them, however, fortunately contracted plague and died of it, and this, together with the hard work of Dr. Po Mya, the civil surgeon, amid an atmosphere of considerable difficulty, achieved useful results. In Maymyo the infection was imported with infected rats in grain and there were 291 deaths: special staff had to be employed, but a vigorous and successful campaign resulted. 67,410 inoculations were performed in the Province during the year.

Fever accounted for a total of 239,448 deaths, or 34.6 per cent. of the mortality. Burma does not enjoy the services of a whole time malariologist, and until such services are available it is practically impossible to make progress. The sale and in some instances free issue of cinchona febrifuge tablets was continued during the year, and here some very interesting figures are given of the annual consumption per head of cinchona febrifuge throughout the province: the amount varies in different districts from 3 to 8 grains per head of the population per annum. *Vitex peduncularis* extract is under experimental trial in malaria.

Influenza was prevalent in some areas, especially a virulent outbreak in the Salween district. Villages were deserted wholesale, and probably some 500 deaths occurred. Beriberi was only mildly prevalent. An outbreak of epidemic dropsy occurred in Pagan Jail and another in the military police at Victoria Point.

The total expenditure on sanitary works was Rs. 89,66,675: which represents some 56.5 per cent. of the income of municipalities and 4.5 per cent. of that of district boards. (Figures of this type, one may remark, are badly wanted and it would be of great interest to secure figures for all India and for the different Provinces, shewing what proportion of the public revenues is expended on law, transport, general education, etc., as compared with the proportion expended on medical

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relief, medical education and preventive medicine. The results might be startling: at present we are inclined to believe that public health comes nearly last when it comes to apportioning revenue.)

The Port Health Department, Rangoon, dealt with 1,412 vessels and 300,943 passengers: a sufficient indication of the onerous nature of its duties. Sanitary inspection of Anglo-Vernacular and European schools in general shewed a satisfactory state of affairs. On the other hand Municipal Committees tend to become retrograde in matters of public health. Appointed in 1921, and given the option of co-opting civil surgeons and health experts as members, many such committees have ignored such available advice, and their attention has been drawn to the matter in a Government circular.

In conclusion Colonel Bisset comments on the future prospects in Burma. The adult Burman, he considers, will never develop a public health conscience, but the schoolboy may be taught. Here the first necessity is to first train the teachers: and Major G. G. Jolly, I.M.S., who joined the department in 1922 as Assistant Director, made a good beginning by giving courses of lectures to university candidates for the teacher's diploma. It is along lines such as these that the most hopeful progress may be looked for.

The appendices to the report include many statistical tables, and a very interesting report by Dr. J. P. Cullen, M.D., D.P.H., Chief Medical Officer, Burma Corporation, Namtu, on the mines in the Northern Shan States. Considerations of space preclude this from our review, but one interesting point in it may be especially noted for those interested in the subject: both relapsing fever and beriberi are found to occur only among the Chinese in the mines. The men infected with beriberi were found to have contracted with a contractor to feed them, the sole article of diet given was polished rice, and analysis shewed that of four samples used two were below the figure fixed by legislation in phosphorous content and the other two were at the border line figure.

We wish that reformers in a hurry would pause to study documents such as this. They reveal far more of the real conditions and problems present than does any congress oratory. We fear that any such wish is vain. On the other hand, depressing as conditions are, the outlook is not without hope for the future.

TRIENNIAL REPORT FOR THE HOSPITALS AND DISPENSARIES IN BURMA, 1920 TO 1922. RANGOON, SUPERINTENDENT, GOVT. PRINTING, BURMA. PRICE Rs. 2-8-0.

THIS report which is by Colonel P. Dee, M.B., I.M.S., deals chiefly with a period when Lt.-Colonel J. Entrican, M.D., C.I.E., I.M.S., was in charge. Colonel Entrican left on leave prior to retirement in September 1922, when Colonel Dee took over charge.

The triennium was a very important one, since, under the Reforms' Scheme it was proposed to hand over the management of hospitals and dispensaries to local committees. A somewhat similar scheme which was tried some years ago had to be abandoned for two chief reasons: the committees were found to be insufficiently independent of control by the Municipal Committees, and the budget balances at the end of any financial year went, not to any hospital fund but to general municipal funds: secondly, subscriptions from the public all went to providing extra comforts, etc., for patients, and none towards meeting the usual expenses of the hospitals. This has now been changed and under a Government resolution a new system of committee management adopted which is now on trial.

A further important departure is the opening by the University of Rangoon of an M. B. course for students. Here, as so often in India, the chief difficulty encountered is the provision of facilities for the study of gynæcology and midwifery.

The pay of all grades of the medical services was improved during the triennium, thus removing to a great extent the discontent which had become rife. Although the sanctioned I. M. S. cadre for Burma is 42 (35 appointments plus a leave reserve of 7), only 31 officers were available at the end of 1922, and the shortage of commissioned officers has been seriously felt. The Uncovenanted Medical Service disappeared from Burma in 1922 with the retirement of its last member there, Dr. H. E. Wells. More civil surgeoncies were made over to civil assistant surgeons, the number of such permanent appointments being raised from 4 to 8. In addition to this free facilities were granted during the triennium to assistant surgeons to officiate as civil surgeons, and on the whole, it is recorded that they have carried out their duties very satisfactorily. At the end of 1922 there were 27 military assistant surgeons on the cadre, 35 civil assistant surgeons and 3 private practitioners. The Inspector-General writes that, whilst he is satisfied with the general work of the civil assistant surgeons he finds them too reluctant to undertake surgical work, "in many of the hospitals I found excellent operation rooms and equipment, but practically no surgical work was done."

With the increase in pay of sub-assistant surgeons to Rs. 100-25-200-225-250, no difficulty has been experienced in getting this useful class of officers. The sanctioned cadre is 389, but there are 420 at present employed. "There can be no doubt that sub-assistant surgeons in most instances are doing useful work in the Province and have been of great assistance." Post-graduate training for sub-assistant surgeons of less than ten years' service has been introduced, and it is hoped to do away with the system of examinations for promotion and to substitute a system of post-graduate training. With regard to other branches of personnel, the pay of compounders has been improved, nursing sisters it has proved almost impossible to get since they can easily earn much more in private nursing in the larger cities, whilst compulsory registration of nurses and midwives became law in November 1922 a much needed improvement.

The triennium opened with 269 hospitals and dispensaries, and closed with 284. The travelling dispensaries have proved so successful that proposals to extend this sphere of work are under consideration. Not only are they of great value in providing medical relief in outlying districts, their educational value is considerable. A scheme has also been instituted of providing some knowledge of the rudiments of western medicine to the *Se-Sayas*, and a Burman sub-assistant-surgeon selected to teach them. Maternity wards, shelters and homes have developed considerably in the different provincial hospitals as the result of private and public donations. The Red Cross Society has commenced an active campaign of public health, child welfare and similar activities. The total number of indoor and outdoor patients attended is steadily rising year by year, and in 1922 totalled 2,125,784 or, during the triennium no less than 16 per cent. of the population; a figure which suggests that some 5 per cent. of the population visit hospital per annum.

Of different diseases malaria accounted for 15 per cent. of the total attendance during the period. Cinchona febrifuge tablets have been substituted for quinine. Small-pox is troublesome, but compulsory vaccination of all in-coming passengers into Burma helps to keep it in check. Plague has increased in virulence, with a case death rate of over 60 per cent. of admissions during the triennium,—as most cases when brought to hospital are nearly moribund. Santonin being so expensive, "kirmani powder" was tried as a substitute, but found to be of little value. No less than 50,201 cases of venereal diseases were treated in 1922, and these constitute a serious problem in the Province. Treatment is unsatisfactory, as most patients discontinue treatment after one or two preliminary injections have cleared the more obvious clinical symptoms. Several fatalities occurred in the use of salvarsan derivatives by quacks, and it has been proposed to legally classify these products as poisons within the provisions of the Poisons' Act, and accessible

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only to registered medical practitioners. The cost of the salvarsan derivatives being so high, free treatment is impracticable; and patients are usually asked to pay for the cost of the drug. Tuberculosis is very prevalent in Burma, and especially so in Rangoon with its poorly ventilated places of amusement.

The health of the military police has shewn a marked improvement during the three years. Taking patients generally the Burman shews a readiness to come to hospital far greater than that of the Indian, and Burmese constituted 62 per cent. of those treated. In Rangoon General Hospital there is a steady increase in the general surgical and operative work year by year, and all classes of surgery are well represented. The total income for the hospitals and dispensaries was over 33 lakhs per annum, and private subscriptions shew a satisfactory improvement. In this connection it is interesting to note that over 37 per cent. of such total subscriptions are subscribed by European residents and firms, the Indian and Burman contributions being less generous. In Rangoon a scheme for starting a home for incurables is on foot in connection with the Rangoon General Hospital which may help to free badly needed beds: sub-assistant surgeons here annually receive post-graduate training: and the Inspector-General pleads for a whole time pathologist to deal with the mass of very valuable material for study, much of which at present goes to waste. The four leper asylums have seen considerable improvements, especially in laboratory provision. The Lady Minto nurses during the triennium numbered 323 as against 241 previously. The Dufferin Hospital dealt with 1,697 in-patients during 1922 and is steadily gaining in popularity among the European and Anglo-Indian community, though but little resorted to by the Burmese. Finally Colonel Dee draws attention to what is a serious matter in India also, the abuse of hospital facilities by those who could afford to pay, free patients arriving at hospital in their own private motor cars.

Colonel Dee's whole report is a record of steady progress on which the Province is to be congratulated. The nightmare of stringency of funds appears to rest less heavily in Burma than in India.

ANNUAL REPORT OF THE BURMA GOVERNMENT MEDICAL SCHOOL, RANGOON, FOR 1922-23. RANGOON, SUPERINTENDENT, GOVT. PRINTING, BURMA. PRICE 4 ANNAS.

THIS report, by Lt.-Colonel A. Whitmore, M.D., I.M.S., shews that the Rangoon Medical School is faced, as are other medical schools in India, with the question of coping with ever increasing numbers: the year having commenced with 173 students on the roll as against 162 in 1921-22 and 50 further admissions during the year. The hostel accommodation has been extended. 31 students qualified during the year and 24 students were sent to undergo training in practical midwifery to the Government Maternity Hospital, Madras. At present, apart from provision for lady students at the Dufferin Hospital in Rangoon, there is little accommodation for midwifery training of students in Rangoon, but it is hoped to convert certain wards at the Rangoon General Hospital into maternity wards, when such teaching and facilities will become available. The staff on the School is a very strong one, and, with the institution of an M. B. examination by the University of Rangoon, its future usefulness and success seem assured.

Correspondence.

INSULIN IN THE TROPICS.

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—The following observations on the potency of a sample of insulin recently imported into India may be of interest. The sample was obtained in London on 27th August last and tested in Lahore on the 16th, 17th and 18th October, no special precautions in the way of cold storage having been taken to preserve its potency in the meantime. The insulin was of American manufacture, and, judging from one's previous experience in England with insulin of the same brand, was presumably of full strength when it left London. One c.c. had contained 20 units.

The sample was tested by observing its effect on the blood sugar of rabbits: although this has been shown by McLeod and others not to be a satisfactory method of standardisation, it nevertheless gives an indication of the strength of the extract and has been the method mostly used until recently. While the experiments were being carried out I noticed in the press a communique from the Government of Burma pointing out the great deterioration undergone by insulin in the tropics as revealed by observations made at the Pasteur Institute, Rangoon. The result of my examination of a single sample bears out these results, although the amount of deterioration is much less than that found in the samples tested in Burma. One c.c. containing originally 20 new units produced convulsions in a small rabbit when the blood sugar was less than 0.034 per cent. This amount, therefore contained roughly about one "rabbit dose," i.e., 3 new units. The preparation would therefore appear to have deteriorated to about 1/7th to 1/8th of its original strength. The results of three experiments were as follows:—

Experiment I.—Rabbit 1.20 kilos.
Starved for 18 hours- ¼ c.c. insulin subcutaneously.
Original blood sugar—0.140 per cent.
Blood sugar ¾ hour after insulin 0.131.
" " 1¾ hours " " 0.098.
" " 3 " " " 0.071.
" " 4¼ " " " 0.089.

Experiment II.—Rabbit 1.20 kilos.
Starved for 24 hours—½ c.c. insulin subcutaneously.
Initial blood sugar—0.141 per cent.
Blood sugar ½ hour after insulin 0.080.
" " 1 " " " 0.062.
" " 1¾ hours " " 0.071.
" " 2¼ " " " 0.071.
" " 3 " " " 0.085.

Experiment III.—Rabbit 1.25 kilos.
Starved 24 hours—1 c.c. insulin subcutaneously.
Initial blood sugar 0.135 per cent.
Blood sugar ½ hour after insulin 0.092.
" " 1 " " " 0.079.
" " 1½ " " " 0.060.
" " 2¼ " " " 0.053.
" " 3¼ " " " 0.034.

The animal went into convulsions two hours later.

The blood sugar was estimated by MacLean's method for 0.2 c.c. blood.—Yours, etc.,

T. A. HUGHES, M.D., M.R.C.P.,
Major, I. M. S.

LAHORE,
24th October 1923.

PLASMODIUM TENUE AND *P. OVALE.*

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—With reference to Professor Stephens' letter on this subject in the October 1923 number of the *Indian Medical Gazette*, while expressing no opinion on the supposed decease of *Plasmodium tenue* or the disputed viability of the prematurely-born *P. ovale*, I should like to express my sympathy with Professor Stephens in his protest against neither being given any chance of existence because they had not been properly christened in a bath of hæmatoxylin. Surely all previous malarial parasites have been born in drought, rained upon by alcohol, and then christened in Romanowsky.

Having at their birth passed unscathed through this experience, surely it is fair to test the viability of other newly-born malaria parasites with the same ceremonies,

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since at present there is no other standard of comparison. —Yours, etc.,

H. E. SHORTT,
Major, I. M. S.

PASTEUR INSTITUTE, SHILLONG,
6th November 1923.

MALARIA IN ASSAM.

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—You may be interested to learn of the discovery in Assam, during an investigation in which I am engaged at the instance of the Indian Tea Association into conditions affecting the incidence of malaria in the tea gardens of this province, of the anopheline mosquito *A. umbrosus* (Theo.).

This species it is, of course, which is so closely associated with the epidemiology of severe malaria in Malaya, and it is therefore fair to presume that its presence in Assam is a factor of importance in the tea gardens; to what extent will, it is hoped, be elucidated by the continuance of the observations now being carried out.

The effect of its ravages was typically seen in a settlement of *Daphlas* carved out of the jungle in the Balipara Frontier Tract which I visited at the invitation of Captain Navill, P. O., with Dr. Forsyth and Dr. Jameson. I could only conclude during my visit there that the splenic index of 100 per cent. among the children was due to the operations of *A. umbrosus*. The conditions were exactly similar to those in places in Malaya where *A. umbrosus* is found to be causing much malaria, and many breeding places of the species were found.

This is not perhaps a matter of surprise, for the Assamese fauna in general and the anophelines in particular follow the Malayan so closely,—indeed Christophers anticipated the discovery in his *Synoptic Table of Indian Anophelines*.—Yours, etc.,

C. STRICKLAND, M.A., B.C.,
Professor of Medical Entomology, Calcutta School of Tropical Medicine, and Officer in Charge, the I. T. A., Malaria Enquiry, Assam Tea Gardens.

12th November 1923.

RHINOLITHS.

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—In your issue of October 1923, Mr. L. M. Chakraverty describes a rhinolith removed from the nose of a Mahomedan male, aged 38, and asks whether it is possible for a tamarind seed put in some 28 years ago to form round it a rhinolith. My experience at the J. J. Hospital, Ear, Nose and Throat Department, where every day some foreign body is removed from either the nose or throat is that:

(1) Tamarind seeds are the commonest seeds introduced into the nose by small children, not adults, and it is customary for the parents to bring the child within a few days to a few months. It could not remain there for 28 years without causing trouble.

(2) Rhinoliths occur after injury to the nasal mucous membrane such as after bleeding or pricking, and the rhinolith forms from the secretions of the nasal mucous membrane aided by bacteria, as with gall and renal stones, and occurs in those cases only where an irritating nasal discharge has lasted a couple of years or more.

(3) That it is often difficult to remove these rhinoliths, not the socalled foreign body or pebble or stone entirely.

It is most likely that the tamarind seed was put into his nose and either passed out or was swallowed by the patient when twelve years of age. Certainly there was no evidence of its presence in the broken pieces removed by Mr. Chakraverty.—Yours, etc.,

F. W. BANA, M.B.,
M.R.C.S., D.P.H., D.T.M. & H,
Junior Hon. Aural Surgeon, J. J. Hospital, Bombay.

BOMBAY,
12th October 1923.

Service Notes.

APPOINTMENTS AND TRANSFERS.

MAJOR-GENERAL C. H. BOWLE-EVANS, C.M.G., C.B.E., M.D., is appointed as Honorary Physician to the King, Indian Military Forces.

Lieut.-Colonel F. E. Wilson, I.M.S., is appointed as Civil Surgeon, Quetta, with effect from the 16th October 1923.

Lieut.-Colonel R. F. Baird, I.M.S., is appointed as Inspector-General of Civil Hospitals, United Provinces, with effect from the date on which he assumes charge.

The services of Lieut.-Colonel R. McCarrison, C.I.E., M.D., F.R.C.P., V.H.S., I.M.S., are placed at the disposal of the Foreign and Political Department, with effect from the 1st December 1923.

Lieut.-Colonel R. M. Carter, C.B., F.R.C.S., L.R.C.P., D.T.M., I.M.S., to act as Senior Medical Officer and First Physician J. J. Hospital and Professor of Medicine and Therapeutics, Grant Medical College, Bombay.

Lieut.-Colonel G. D. Franklin, O.B.E., B.A., M.B., I.M.S., is appointed as Chief Medical Officer, North-West Frontier Province, with effect from the afternoon of 15th November 1923.

Lieut.-Colonel H. C. Keates, M.D., I.M.S., is appointed as Civil Surgeon, Amritsar, with effect from the afternoon of 15th September 1923.

Lieut.-Colonel J. W. Watson, C.I.E., I.M.S., is appointed as Civil Surgeon, Ajmere, and Chief Medical Officer in Rajputana, with effect from the 13th November 1923.

Major H. Hingston, I.M.S., to act as First Resident Surgeon, Presidency General Hospital, Calcutta.

Major E. B. Munro, O.B.E., M.B., I.M.S., to act as Civil Surgeon, Burdwan, from the forenoon of 2nd November 1923.

Major K. S. Thakur, I.M.S., is appointed as Civil Surgeon, Bakarganj.

Major S. S. Vazifdar, M.R.C.S., M.R.C.P., I.M.S., to act as Second Physician and Registrar, J. J. Hospital, and Professor of Materia Medica and Pharmacy, Grant Medical College, Bombay.

Major A. H. Proctor, D.S.O., M.D., F.R.C.S.E., I.M.S., is appointed as Civil Surgeon, Murshidabad.

Major N. M. Wilson, O.B.E., I.M.S., is appointed as Civil Surgeon, Lyallpur, with effect from the 15th October 1923.

Major R. A. Chambers, O.B.E., I.M.S., is appointed as Principal, Medical School, Amritsar, with effect from the 22nd September 1923.

Major A. M. Dick, O.B.E., F.R.C.S., I.M.S., is appointed as Professor of Ophthalmology, King Edward Medical College, Lahore, with effect from the 1st October 1923.

Major T. A. Hughes, M.D., I.M.S., is appointed as Professor of Physiology, King Edward Medical College, Lahore, with effect from the 1st October 1923.

Major D. H. Rai, M.D., M.C., I.M.S., is appointed as Professor of Materia Medica, King Edward Medical College, Lahore, with effect from the 1st October 1923.

Major Anderson, I.M.S., is appointed acting Civil Surgeon, Quetta, with effect from the 1st October 1923, in addition to his duties as Civil Surgeon, Sibi.

The services of Captains N. K. Bal, M.C., I.M.S., and N. M. Mehta, I.M.S., are placed temporarily at the disposal of the Government of Madras, with effect from the dates on which they assume charge of their duties.

Captain H. G. Alexander, I.M.S., to act as Second Resident Surgeon, Presidency General Hospital, Calcutta.

Captain R. Sweet, D.S.O., M.B., I.M.S., is appointed as Assistant to the Officer in charge, Medical Store Depôt, Madras, with effect from the 12th January 1923.

Captain S. N. Hayes, I.M.S., is appointed as Civil Surgeon, Dera Ghazi Khan, with effect from the 10th October 1923.

The services of Captain J. W. Jones, D.S.O., M.B., I.M.S., are placed temporarily at the disposal of the Government of Burma, with effect from the date on which he assumed charge.

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The services of Captain T. S. Sastry, I.M.S., are placed temporarily at the disposal of the Government of Madras, with effect from the date on which he assumed charge.

The services of Captain B. G. Mallya, I.M.S., are placed temporarily at the disposal of the Government of Bengal for employment in the Jail Department, with effect from the 3rd July 1923.

LEAVE.

COL. A. W. R. COCHRANE, M.B., F.R.C.S., I.M.S., Inspector-General, Civil Hospitals, United Provinces, is granted leave for 8 months, with effect from the 13th November 1923.

Lieut.-Col. E. F. Gordon-Tucker, I.M.S., Senior Medical Officer, J. J. Hospital, Bombay, is granted leave for 7 months and 1 day, with effect from the 10th November 1923 or from the date of relief.

Lieut.-Colonel R. McCarrison, C.I.E., I.M.S., an Agency Surgeon, is granted leave for 28 months, with effect from the 1st December 1923, on reversion to the Foreign and Political Department.

Lieut.-Colonel H. Hallilay, M.B., I.M.S., Civil Surgeon, is granted leave for 1 year, with effect from the 20th October 1923.

Lieut.-Colonel A. C. MacGilchrist, I.M.S., Civil Surgeon, Howrah, is granted leave for 11 months, with effect from the 7th November 1923.

Major J. J. Harper Nelson, O.B.E., M.C., M.D., F.R.C.S.E., I.M.S., Professor of Materia Medica, King Edward Medical College, Lahore, is granted leave for 8 months and 23 days, with effect from the 16th June 1922 to 1st October 1922.

Major H. H. Thorburn, C.I.E., I.M.S., an Agency Surgeon, is granted leave for 12 months, with effect from the 1st October 1923.

Major E. W. O'G. Kirwan, I.M.S., 1st Resident Surgeon, Presidency General Hospital, Calcutta, is granted leave for 12 months, with effect from the date on which he may be relieved from his duties.

Captain R. Sweet, D.S.O., M.B., I.M.S., Assistant to the Officer in charge, Medical Store Depôt, Madras, is granted leave for 1 month, with effect from the 12th January 1923.

PROMOTIONS.

Lieutenant-Colonel to be Colonel.

J. A. BLACK, M.B., I.M.S., 27th October 1923.

Major to be acting Lieutenant-Colonel.

M. F. White, O.B.E., M.B., I.M.S., 18th June 1918 to 31st July 1919.

To be Captains.

Alexander Henderson Craig. Dated 1st October 1923.

To be Lieutenant.

Gerald Hartas FitzGerald. Dated 1st October 1923.

To be temporary Lieutenants.

Shiv Das Suri. Dated 24th September 1923.
Shambhoo Dayal Misra. Dated 28th September 1923.
Subbier Annaswami. Dated 3rd October 1923.
Amar Nath Duggal. Dated 12th October 1923.
Chandranan Joshi. Dated 20th October 1923.

With reference to Army Department Notification No. 548, dated the 14th March 1919, the promotion to his present rank of Major J. F. James, M.B., I.M.S., is antedated from 1st September 1918 to 1st March 1918.

RETIREMENTS.

LIEUT.-COLONEL DAVID MACDONALD DAVIDSON, C.I.E., M.D., I.M.S. Dated 24th October, 1923.

Major G. Tate, I.M.S. Dated 30th September 1923.

RELINQUISHMENT OF RANK.

CAPTAIN J. R. D. WEBB, O.B.E., I.M.S., relinquishes the temporary rank of Major on ceasing to hold the appointment of Deputy Assistant Director of Medical Services on 28th March 1922.

RESIGNATIONS.

CAPTAIN CHANDIRAM HASSOMAL PRIMLANI. Dated 1st September 1923.

Captain Lal Singh Anand. Dated 30th April 1922.

Captain Brajendra Nath Pal, Captain Prabhat Kumar Bardhan, Captain Kannauthodath Padmanabha Menon. —Dated 1st September 1923.

Captain Bhanwarlal Kinbilal Vardya. Dated 19th September 1923.

Captain Faiyaz Anwar Khan. Dated 22nd July 1923, and to retain his rank.

Captain Buthapuri Thevaperumal Krishnan. Dated 1st September 1923, and to retain his rank.

NOTICES.

ROYAL MEDICAL BENEVOLENT FUND.

THE 88th annual report of this Fund, for the year 1922, shews how widespread are its activities and how great are its needs. The objects of the Fund are to make grants to distressed members of the medical profession and their widows or orphans, and to provide annuities to the more urgent of such cases after 60 years of age. Last year there were 168 annuitants on the roll, receiving annuities of from £20 to £26, whilst the grants, which vary from £5 to £26 according to the necessities of the case, totalled £4,435. The Guild, or Ladies' Branch also renders personal service and also gives grants. That the Fund is well run and administered is shewn by its list of officers, Sir Thomas Barlow being President for 1923, Sir Charters Symonds Hon. Treasurer, and Dr. Newton Pitt, Hon. Secretary.

At the annual meeting, held on the 7th May, the Archbishop of Canterbury was the chief speaker, and his address is one which will be gratefully read by the medical profession. He speaks of the great volume of work unostentatiously carried out by medical workers in both peace and war, of the fellowship of medicine, and the needs of the dependents of medical men, who are often prone to leave but little provision for their families. As a "professional beggar" he knew of no object more deserving of assistance than the Fund. Lord Sumner dwelt on the practice of medicine being often its only reward, he suggested that the working classes of England would be quite willing to help if approached, and gave a most interesting analysis of the best way of getting donations out of wealthy men, the motto being not to overdo it but to lead the donor gradually and almost imperceptibly to his cheque book.

The Royal Medical Benevolent Fund is one of the finest and most deserving of medical charities and one which stands urgently in need of support by the whole profession. The address is 11, Chandos Street, Cavendish Square, London, W.1.

CALCUTTA SCHOOL OF TROPICAL MEDICINE AND HYGIENE.

THE undermentioned candidates passed the Certificate examination in Tropical Medicine and Hygiene held on the 5th October, 1923, and subsequent days. The names have been arranged in alphabetical order:—

1. Mr. Ramchand Chopra, L.M.P. (Lahore).
2. S. A. S. Narhar Kesheo Godbole, L.M.P. (Nagpur).
3. S. A. S. Jamadar Vithal Govind Kamat (Diploma holder, B. J. Medical School, Poona).
4. S. A. S. Rama Prasanna Roy, L.M.F. (Bengal).
5. Mr. Jatindra Kumar Sen, L.M.P. (Bengal).
6. Mr. Baldeo Sinha, L.M.F. (Bengal), L.M.P. (Bihar and Orissa).

*7. S. A. S. Suraj Narain.

* With distinction.

23rd October 1923.

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BOOKS ON DENTISTRY AND DENTAL PERIODICALS.

MESSRS. BAILLIERE, TINDALL & COX, 8, Henrieta Street, London, W.C.2, have recently issued as a small brochure a complete list of current books on dentistry in the English language. The list contains many books of interest not only to dental practitioners, but also to the medical man and to the radiologist. A complete list of dental journals is also included. The publishers intend to reissue this catalogue periodically, and would be glad to have the names of those who wish to receive it. Messrs. Baillière, Tindall & Cox's new departure is one to be welcomed, and we trust that it will receive the support of our readers.

LONDON MEDICAL EXHIBITION, CENTRAL HALL, WESTMINSTER, LONDON.

October 1 to 5, 1923.

EXHIBIT OF BURROUGHS WELLCOME & CO.

THE interest and enthusiasm aroused by the discovery of Insulin and the results of its use in diabetes mellitus, fully justified the prominent position assigned to this product in the effective exhibit of Messrs. Burroughs Wellcome & Co. at the London Medical Exhibition. Eleven stages in the production of "Wellcome" Brand Insulin, starting with the ox pancreas and ending with the refined product now available for medical use were shown. It is easy to understand that the exceptional equipment and long experience of Burroughs Wellcome & Co. on the chemical and pharmaceutical side of biological therapy, placed them in a particularly advantageous position for the large-scale production of Insulin.

Other biological preparations were shown, a very interesting series being that of the various glands which enter into the composition of "Tabloid" Mixed Glands, Male and Female. "Hypoloid," "Infundin," a stable, sterile, posterior pituitary extract, took its place in the group of medicinal products of animal origin. Sera and vaccine charts, displayed on the walls of the exhibit, indicated in attractive fashion, the wide range of modern *materia medica* issued under the "Wellcome" Brand.

Two striking tropical diseases map displays were exhibited in conjunction with various medicinal products of particular importance in such diseases. Among these were "Kharsivan" and "Neokharsivan," for use in syphilis, yaws, tropical ulcer, etc., "Tabloids" and "Wellcome" Quinine preparations for malaria, "Moogrol" for leprosy, and "Soloid" Antimony Tartrate for bilharziosis, kala-azar and oriental sore.

A group of all the various rustless steel hypodermic needles now available formed another attractive feature of this firm's display, while most of their well-known "Tabloid," "Soloid" and other products were also in evidence.

INTERNATIONAL UNION AGAINST TUBERCULOSIS.

THE Council of Directors of the International Union against Tuberculosis held its annual meeting in Paris on July 26th, 1923, at the headquarters of the League of Red Cross Societies. Twenty members of the Council from different countries met under the presidency of Dr. Dewez of Brussels.

Professor Leon Bernard, Secretary General, gave an account of the development of the Union since the Brussels conference. It was decided that the following questions should be placed on the agenda of the conference to be held at Lausanne in September, 1924.

(1) Relations between pregnancy and tuberculosis, to be reported on by Prof. Forssner (Stockholm).

(2) Do there exist naturally or can there be produced artificially saprophytic forms of Koch's bacillus which might become virulent tuberculosis bacilli?

Report by Prof. Calmette (Paris).

(3) Effects of the organization of the anti-tuberculosis campaign in different countries on the decrease in tuberculosis mortality.

Report by Sir Robert Philip (Edinburgh).

The report of Prof. Besancon (Paris) on the question of the "respective value of techniques for the identification of Koch's bacillus in the diagnosis of lesions in human tuberculosis" gave rise to an interesting discussion. This report will appear in the next number of the *Bulletin of the International Union against Tuberculosis.*

THE "SUNIC" DIATHERMY APPARATUS.

DIATHERMY is to-day a new, a most important feature of medical and surgical therapy, and one with an immense future. But in such apparatus it is essential for the practitioner to get hold of absolutely reliable and sound apparatus. The chief difficulty with the apparatus is the spark-gap, and here Messrs. Watson and Sons' outfit with its gas-atmosphere for the spark gap is an immense improvement upon other models. In matters electrical,—as in many others,—India suffers to an extent not always realised from inferior apparatus and bad workmanship, as every civil surgeon knows. Bad steel in his instruments, bad finish, and bad workmanship are characters of much of the medical and surgical apparatus on the Indian market, and the civil surgeon with any experience knows that he is only safe in ordering direct from home or from reliable firms in India. In Messrs. Watson and Sons' little illustrated brochure on their "Sunic" diathermy apparatus he will find what he can rely upon as thoroughly sound, as first class workmanship and as thoroughly reliable. This little brochure contains an interesting abstract from an address at the Electro-therapeutic section of the Royal Society of Medicine by Dr. E. P. Cumberatch on the general principles and uses of diathermy, and an illustrated price list. The principal apparatus for thermo-penetration and coagulation complete, and mounted on a portable trolley is listed at £73-18-6: a special foot switch for surgical work which leaves both hands free for manipulating the electrode and tissues—an absolute essential, because any apparatus which necessitates manipulations with the hands at the most critical moments of operative procedure is unsuitable,—at £4-4-0; a rotary converter for use with direct current in place of alternating at £40: and a diathermy condensation couch with complete fittings at £33-12-0. The address of the makers is Messrs. Watson and Sons, Ltd., Sunic House, Parker Street, Kingsway, London, W.C.2, and their Indian agents are the General Electric Co. (India), Ltd., 14, Old Court House Street, Calcutta, and 106, Armenian Street, Calcutta. The medical man who desires further information about this new and exceedingly important departure in medical and surgical practice, however, would do well to communicate direct with the home firm.

Notice.

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles will receive 25 reprints of the literary pages of the *Gazette gratis*, if asked for at the time of submitting their manuscripts.

Reprints of the article concerned (only) in place of reprints of the whole of the literary matter of the issue can be supplied on payment.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE EDITOR, *The Indian Medical Gazette*, c/o Messrs. Thacker, Spink & Co., P. O. Box 54, Calcutta.

Communications for the Publishers relating to Subscriptions, Advertisements, and Reprints should be addressed to THE PUBLISHERS, Messrs. Thacker, Spink & Co., P. O. Box 54, Calcutta.

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Original Articles.

NOTES ON MALARIA IN SHILLONG.

By T. C. McCOMBIE YOUNG, M.D., D.P.H.,
LIEUT.-COLONEL, I.M.S.,
Director of Public Health, Assam.

IN 1922, the question of malaria in Shillong began to attract an increasing amount of attention. The Civil Surgeon was impressed by the number of cases he had seen which were almost certainly acquired in Shillong, and the existence of a malarious belt along the banks of the Umkhrah was suspected, as cases, presumably of locally acquired malaria, were known to have occurred at times in certain bungalows in the Umkhrah Valley and elsewhere. Accordingly the Municipality was approached for the provision of a staff to work under my direction to secure the necessary detailed information, and the entertainment of a trained insect collector was sanctioned, who commenced work in August 1922. His duty was to make a systematic search of all potential breeding grounds for anopheles larvæ. His daily catch was hatched out and identified in the Public Health Laboratory, the accuracy of his observations being checked by me every Saturday, when in the station, by visits to the places in which he had found larvæ.

A year's observations have now been completed, and a very large number of anopheles' breeding grounds (239) have been discovered.

Major Shortt, I.M.S., on an interesting paper in the January 1924 number of the *Indian Journal of Medical Research,* has dealt with the systematic and epidemiological aspects of the case, and it remains for me to deal with the detailed survey and its practical applications. These observations seem to support Major Shortt's conclusion that, from a practical point of view, it is only the breeding grounds of *A. maculatus* with which we need be concerned. The larvæ of this species of mosquito, which is a most potent vector of malaria in certain malarious areas in the plains of Assam, after the onset of the rains and until their cessation, can usually be found, in greater or lesser numbers, in sedgy water-logged grass situated below the seepage line in nullahs whose drainage is obstructed. These are naturally most common in the valleys of the following streams—the Um Shirpi, the Umkhra, and its tributaries, particularly the Pomdingim. These breeding grounds during the rains are to be found throughout Shillong, although the number of these areas whose quantum of production is probably dangerous, is fortunately small.

The anopheline year in Shillong is conveniently divisible into three different seasons:—

I. The cold weather season, from the cessation of the rains in October until March. During this season, large numbers of a big handsome mosquito, *A. gigas,* can be collected and its favourite habitat is clear rocky pools, or perennial springs. This mosquito is only found in the hills, and its seasonal prevalence is at a time when the temperature of the air probably precludes the possibility of its becoming infected with the malaria parasite, and nowhere has it, to my knowledge, been suspected of being a carrier of malaria. Its presence is, therefore, of only entomological interest. Towards the end of this period *A. aitkeni* appears, but in limited numbers.

II. The hot dry months:—During these months, only the beds of the streams act as breeding grounds, and in them, *A. maculatus* is the common mosquito. During 1923, *A. maculatus* larvæ began to replace *A. gigas* in May, the first *A. maculatus* larvæ being collected on the 25th May, 1923, but in other years, I have repeatedly found larvæ of this mosquito in the streams in April, which is probably the month in which its prevalence normally dates.

At this time of year the optimum conditions for *A. maculatus* seem to be found in a rock-bound sandy pool, cut off from the main stream by the fall of the water level, and the absence or otherwise of these larvæ is determined by the scouring out of such pools by storm water. This year, 1923, has apparently been a comparatively healthy year with regard to malaria, and this I would attribute to the early rains in the spring which repeatedly scoured out the pools and retarded the propagation of *A. maculatus.* This observation lends support to the views of old residents who maintain that early rains clean up the town and make it more healthy.

III. Rainy season:—With the advent of the rains, flood water scours out the streams, rivulets and drains at frequent intervals, and prevents breeding in them to any appreciable extent. *A. maculatus* then seems to betake itself to swampy ground fed by seepage water and springs in the valleys, of which despite the clearance of the station and attempts at drainage of such areas, there is a surprising number. Some of these during the rainy season are regular swamps, and they vary in size and potentiality for evil from little patches of moist grass, fed by seepage water on hill sides, above a road, or beside a football ground, to fairly large swamps. When the rains cease or slacken, and before the temperature has fallen below a point at which the hot weather species cease to breed, the surface drains of the

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station may, for a short time, act as breeding grounds of *A. maculatus*. For example a length of drain below Pinemount School in the nullah between it and 'Hopedale,' 'Avondale' and 'Brightwells' was in October 1922 breeding *A. maculatus* in fairly large numbers and may have been responsible for a case of what was probably locally acquired malaria in the Chief Secretary's house. By November the *A. maculatus* season is practically over, though a few larvæ can still be recovered from the pools in November and December, and *A. gigas* whose larvæ began to appear in the pools in October, now monopolises the breeding grounds, and remains in almost undisturbed possession of them until May, when *A. maculatus* first appears, *A. gigas* disappearing altogether in June.

Adult anophelines were caught at various times in cowsheds and servants' houses, but in scanty numbers. The species so caught in the course of this investigation were *A. maculatus*, *A. gigas* and *A. fuliginosus*. The latter species is suspected elsewhere of being a carrier, but those caught were found only in cowsheds, the larvæ are few and its presence may probably be ignored in reckoning up the factors which make for the malariousness of Shillong.

The rice fields which abound in and around the station were carefully watched. In May, June and July, along with the predominant species breeding in this environment (which is the presumably harmless *A. sinensis*), a few larvæ of *A. maculatus* were constantly recovered in the course of this investigation, and in Major Shortt's paper he records the capture of *A. maculatus* from rice fields in the end of 1922. While the numbers so collected at any one time are few, the total output of *A. maculatus* from the rice fields in the Umkhrah Valley while the rice is being irrigated must be considerable, and proximity to these rice fields may be a factor in the malariousness of the houses above the Umkhrah Valley, although fortunately it is not the only factor.

A rice field which is lying fallow, and is full of sedgy water-soaked grass and weed, is, however, a prolific breeding ground of *A. maculatus*. Besides *A. maculatus*, *A gigas*, *A. fuliginosus*, and *A. sinensis*, other anophelines which have been collected and identified in the course of this enquiry are *A. aitkeni*, *A. lindsayi*, *A. willmori* and *A. vagus*. All except *A. aitkeni* were scanty, and all of them are only of entomological interest. At no time was *A. minimus*, which was collected by Major Shortt, seen by me in the course of this investigation, and as this anopheline is a potent vector of malaria, it is fortunate that it appears to be scanty.

The culicine fauna of other collections of water may be worthy of mention in this note, although they are without bearing on the malarial question. *Aedes* mosquitoes, an active and persistent species, breed in the cut ends of bamboos and in fire buckets and other collections of clean domestic water, and are a domestic pest, while a half-filled manure pit, with rain water standing in it, often contains culicine larvæ by the thousand; in fact, experience shows that one is usually justified in assuming that when a householder complains of the number of mosquitoes in his bungalow it is because he is breeding them on the premises in some such collection of water.

While it would be superfluous to describe all of the 239 breeding grounds observed, the more important of these should be dealt with by drainage and the detailed recommendations for the drainage, by contour drains, of seepage areas and swampy ground which serve as breeding grounds of *A. maculatus*, are omitted, being of only local interest.

Although the anopheline breeding grounds are so numerous and scattered everywhere throughout the station, gardeners will be glad to learn that the irrigation channels have not, at any time, been convicted of breeding mosquitoes, and the presence of these channels in the station is no way inimical to its health.

I think it can fairly be assumed that the prevalence of malaria in Shillong is not such as to impair its economic efficiency and social amenities, and that as a commercial proposition, no large expenditure is justified. I do not, therefore, recommend any drastic and expensive anti-malarial measures, but I would advise that the sodden ground and the swamps to which I have referred should be dried by appropriate measures of drainage.

From a study of the literature of anti-*maculatus* measures elsewhere, I am strongly of opinion that these measures of drainage must be the provision of contour drains along the side of the valleys at the seepage level, and if these prove satisfactory, they might eventually be made into subsoil drains, as experience elsewhere has proved that by this method of drainage a marshy nullah can be made bone dry. There is, however, the difficulty that such subsoil drains entail rather heavy maintenance charges.

The exact details of these operations may be left to the Executive Engineer, and I will say no more than to add a word of caution against taking the line of least resistance, and digging a central drain down the centre of the nullah. This may lead off storm water and some of the seepage water, but it does not prevent mosquito breeding in the wet areas that remain on each side of it, and this method of drainage will not result in appreciable reduction of anopheles breeding which is the object of the measure.

The question of personal prophylaxis is probably more important in Shillong than

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engineering operations. In view of the probability that the rice fields in the Umkhrah Valley can produce an appreciable and probably dangerous number of *A. maculatus* from April or May until the end of October, residents of houses situated on the heights above the stream would probably be well advised to protect themselves by the use of mosquito nets at night during these months.

Within the station, however, and especially if the minor improvements which I have suggested in the valley of the Ka Wah Pomdingim and elsewhere are effected, it would appear as if the chances of acquiring malaria in Shillong are so slight as to be negligible and to demand no special personal precautions.

MALARIA ON AMBOOTIA TEA ESTATE NEAR KURSEONG AND THE SUCCESS OF SOME ANTI-MALARIAL OPERATIONS.

By C. STRICKLAND, M.A., B.ch. (Cantab.),

Professor of Medical Entomology, School of Tropical Medicine, Calcutta.

THE malariology of hill-stations is an important subject, for visitors do not go to them to spend their holiday abed with fever. Any contribution, therefore, to our knowledge of the subject may be helpful.

The observations now recorded were made in May 1923 during a visit to Ambootia Tea Estate, Kurseong, about 3,000 feet above sea-level in the Eastern Himalayan foothills. They indicate the salient factors which determine malaria incidence on the estate; and their analysis throws into relief the effect of the anti-malarial operations which had been initiated with uncommon enterprise by the Manager, Mr. A. O'Brien-Webb, at the instigation of the Visiting Medical Officer, Dr. Kingsley-Ward. The nature of the operations was mainly the drainage of swamps and training of streams.

In the course of the work the first point considered was whether the rainfall had anything to do with the malaria-rate. Generally speaking when a malaria-rate corresponds with a moderate rainfall, one would incriminate swamp-breeding anophelines; while if such data have an inverse relationship stream-breeders might be suspected; the reason being that heavy rains scour out the breeding places and so diminish the sources of malarial infection. This has been emphasised by Perry (1914) with reference to the Jeypore hill-tracts.

The estate records which were necessary to decide the point had been in charge of the Medical Officer of the estate and the conclusions submitted are drawn from the analysis of those from 1917 to the present time.

A chart drawn to show the rainfall, the case-returns, and the case-rate (i.e., the number of cases per cent. of population) every year, and also these data computed for the 12-monthly periods from June to May revealed no direct correlation in them; indeed, between the incidence and the rainfall there was a tendency to inverse correlation (Chart 3). There was, however, no doubt about the inverse relationship if the data were compiled for the period January to May of the year, and the inversity was also evident in the June to December period (Charts 4 and 5).

These findings then indicate that the pathophors here are stream-breeders, and this conclusion is supported by the fact that the writer had much difficulty in capturing any stream-breeders after the fall of several very heavy "chota-monsoon" showers just previous to his visit, and that "swamp-breeders" were absent.

The circumstance of the inversity, within any period, of case-rate to rainfall does not give much scope for predicting the severity of the epidemic season; but a good means of prediction was discovered by charting yearly rainfalls against case-rates for the period January to May following, during which the epidemic becomes well established. It then appeared that the greater the monsoon rainfall any year, the less the case-rate in the epidemic season next year. Marjoribanks (1914), referring to malaria on Salsette Island, has averred the same fact in his statement that "a dry year followed by an ordinary year causes an increase of malaria-incidence." Christophers (1911) and Gill (1922) have recognised the general importance of being able to predict malaria epidemics, in setting forth the factors conducing to them in the Punjab.

Incidentally the fact that on Ambootia Estate a heavy monsoon year is followed by a light epidemic year, proves that on these slopes seepage of subsoil-water for months after the monsoon does not occur to any extent. If it did, one would feel sure that there would be a rich legacy of dangerous spring-water breeders such as *A. maculatus* causing much trouble long after the rains cease, but this is not the case. Probably the decomposed micaceous granite soil here is so porous that water flows away through, almost as readily as over, it.

The relationship between rainfall and malaria was further analysed in Chart 7, where the monthly records from 1917 to 1923 are given. Apart from any question of rainfall-malaria correlation it must be observed in this chart, that subsequently to March, 1922, when Mr. Webb started his anti-malarial operations (as noted above) the improvement of health was immediate and

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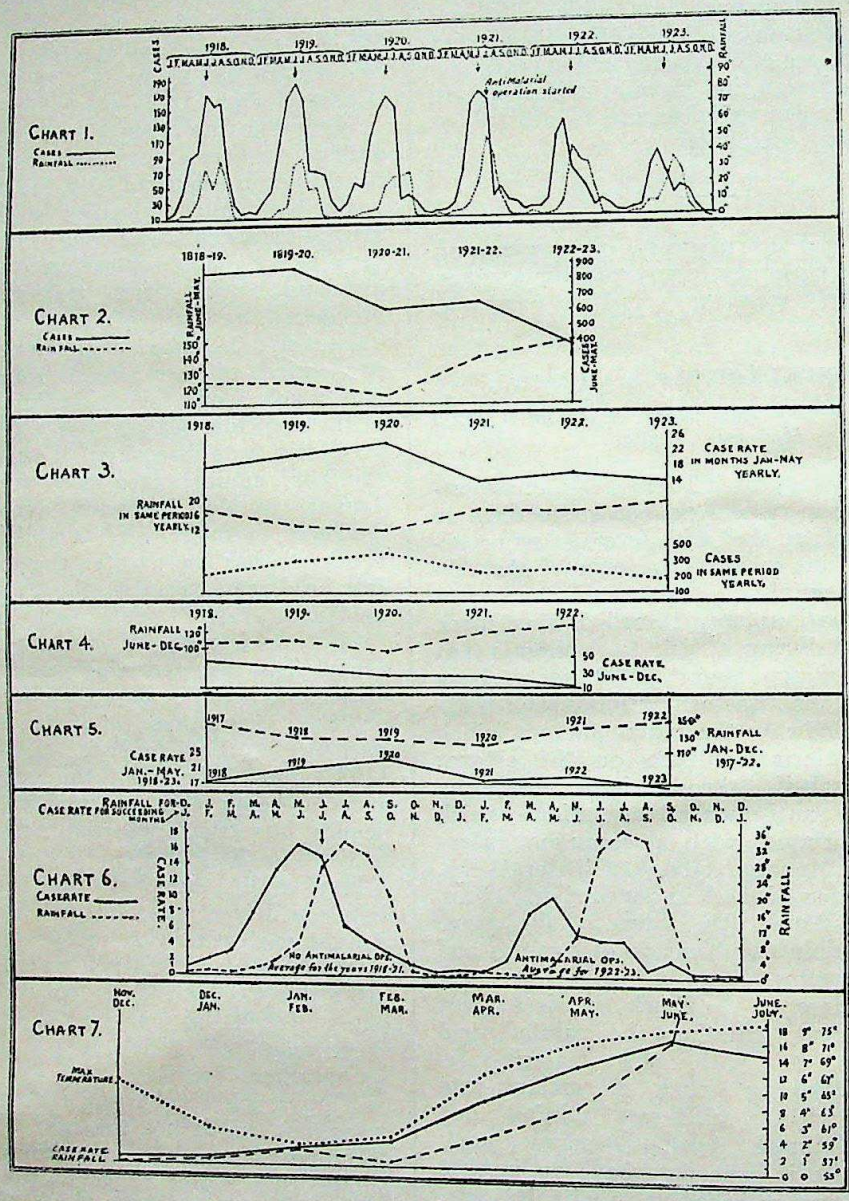
sustained. The reason for this was probably the fact that the troublesome mosquitoes, being stream-breeders, had been subjected by means of the operations more than naturally to the force of the "chotamonsoon" showers.

The monthly data have been condensed in Chart 6 into two periods, first for 1918–21 and then the years 1922-23 during which anti-malarial operations have been in progress, but in this chart rainfall has been apposed to the malaria incidence *of the subsequent month* for the reason that the development of the mosquito and its malaria parasite and its incubation in man takes a month or more to complete. A study of the chart and also of Chart 7 which gives the same data on a larger scale (for the early months only),—Chart 7 giving also the temperature records,—leads to the following conclusions:—

(a) In the pre-monsoon period, from November to February inclusive, the malaria case-rate of the succeeding month goes up independently of both the monthly temperature and the rainfall. Probably the slight rise in case-rate is here due to recurrences induced by cold and exposure.



(b) After February until May the same data are very closely correlated;

(c) which proves that the rising rainfall with its tendency to depress the case-rate is counterbalanced by some other factor, and this is probably, at this time of year, the rising temperature.

(d) After the monsoon breaks, the great increase of rain in June and July, is responsible

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for a rapid decline of malaria in July and August;

(e) which proves that the May brood of mosquitoes begins to die out by July, and that in general mosquitoes do not cause trouble by living long.

(f) When the rains abate rapidly the malaria-rate falls less rapidly.

(g) When anti-malarial operations are being carried on, as seen in the second part of Chart 6, the lighter increase of rain in May is responsible for a striking fall of case-rate in June or a month before normal.

(h) The effect of anti-malarial operations has been to cause a general decrease of malaria incidence.

In confirmation of the conclusion that the anti-malarial operations on Ambootia Estate have been effective in reducing malaria, the following facts may be cited:—

Division A in 1921 had no operations and 122 cases: in 1922 slight operations and 133 cases. Whereas

Division B in 1921 had no operations and 56 cases: in 1922 no operations and 112 cases.

Further, Division C in 1921 had no operations and 185 cases: in 1922 most intensive operations and 92 cases.

While Division D in 1921 had no operations and 283 cases: and in 1922 after operations 138 cases.

The most important immediate factor in the situation must be the mosquito fauna and its habitat. That the mosquitoes causing the trouble are stream-breeders was the conclusion come to from the preliminary analysis given above, and those found on the estate were *A. willmori, A. maculatus,* and *A. aitkeni*: the first two, of course, being very dangerous. Other species taken were *lindesaii, barbirostris* and *vagus*, while outside of the estate in stony pools of the bed of the Balasun river *A. willmori* and *A maculatus* were caught in very large numbers.

The Balasun flows in a valley 1,500 feet below the estate about three-quarters of a mile off as the crow flies and whether the valley was not a very great danger or not was a matter for serious consideration. Probably it is not, however, for one section of Division A of the estate with a spleen-index of 0.00 per cent. is situated on a knoll directly above the river, nearer in fact than any other division.

The main object of the observations was to localise the sources of danger on the estate and those made, it is hoped, will enable the Manager, Mr. O'Brien-Webb, to complete the work which has already borne good fruit. To him, as also to Drs. Kingsley-Ward and Winckler the writer owes thanks for the help received and he is also indebted to Lt.-Col. McCombie Young, I.M.S., for his useful criticism of the draft report.

SUMMARY.

An analysis of the malaria-rate with possible contributory factors on Ambootia Tea Estate near Kurseong, Eastern Himalayan foot-hills, leads to the conclusion that the amount of rainfall bears an inverse relation to the malaria-rate at all times of the year. Probably the most important factor in the production of the annual epidemic in the spring months is a rising temperature.

The inverse relationship of the rainfall indicates stream-breeders as pathophors, and *A. maculatus* and *A. willmori* being found everywhere, should be incriminated with causing the trouble.

The inversity of the rainfall to the malaria-rate also provides a means of predicting the severity of the latter. But a better method was found by showing that the severity of the monsoon is inverse to that of the epidemic *in the next year.*

The seepage of subsoil water for months after the monsoon is not a factor of importance in affording habitats for the pathophors, nor is the continued existence of any brood of mosquitoes. A breeding ground of *A. maculatus* and *A. willmori* at a distance of about 1,300 yards and 500 yards vertically below is of no economic importance.*

Anti-malarial operations started at the instigation of Dr. Kingsley-Ward by the Manager, Mr. O'Brien-Webb, have been very successful. They prove that the drainage of swamps and training of streams in which *A. maculatus* and *A. willmori* breed are effective anti-malarial measures, though complete success from their employment is not to be expected. Not only have they reduced the malaria-rate, but this has fallen rapidly a full month before the normal fall would take place. Mr. O'Brien-Webb should be congratulated on his good work.

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PRELIMINARY NOTES ON THE USE OF A SENSITISED ANTI-PLAGUE VACCINE.

By C. J. STOCKER, M.C., M.A., M.D., D.T.M., & H.,
MAJOR, I.M.S.,
and
G. F. GRAHAM, M.D., F.R.C.S.I.,
MAJOR, I.M.S.

IT is a matter of great regret, though perhaps not surprising, that sensitised vaccines

* Watson in Malaya has found that breeding places of the strong flier *A. umbrosus* at a distance greater than a quarter of a mile are of no economic importance.

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have dropped into disuse of late years, there is so much about them that is unknown and attractive. It is true that they take a considerable time to prepare, and that the results are frequently disappointing, but when they do 'come off,' they do so in the most amazing way. Surely this should be a reason for studying them further rather than for neglecting them.

The theory of sensitised vaccines is very simple and well known, but there are many points in the application of them which should make one reconsider whether it is as simple as it sounds. Why, for instance, is such a very small quantity of serum sufficient to disarm such an enormous mass of virulent organisms? What exactly is the relationship between the agglutinins and the sensitising body? Why is there no local reaction on injection, and why does the vaccine sometimes fail so ignominiously and sometimes give the most theatrical results?

It is as though there were some stage in the reaction of the body to the invading organism which is materially assisted by the sensitised vaccine; if the vaccine be given at the right time success is assured, but if that time be missed the result is a failure.

The more one considers the problems the more one realises how absolutely ignorant we are of the whole subject, and the less satisfied one becomes with the little that has been written about it; further than that one is inclined to add, the more one is convinced that in the unknown principle underlying sensitised vaccines lies a new and hitherto unsuspected conception of the whole subject of immunity.

There are a number of interesting side-lines too, which appear to be worth exploring, such as the possibility of using a convalescent patient's serum for sensitising the vaccine, the effects of using a mixture of sensitised plague and streptococcal or pneumococcal vaccines, for the sensitised plague vaccine appears to have no power to prevent suppuration of the bubo or the occurrence of pneumonia as a complication. The use of the vaccine would also be worth trying as a prophylactic, as there is no local reaction with it.

The cases in which sensitised vaccines appear to do most good, for some reason, are those in which there is a local focus of infection with general symptoms superadded, such as carbuncle or gonococcal orchitis, and it is for this reason that it was thought that they might be worth trying in plague.

It is no part, however, of the object of this article to discourse on sensitised vaccines in general, but rather to give some account of their use in this particular epidemic, leaving the reader to judge for himself whether they are worth trying on a larger scale.

The method of preparation will be described first, followed by some remarks on the dosage and figures showing the results and lastly some charts selected out of records of 47 cases which occurred during this particular epidemic.

Preparation.—For the preparation of the sensitising serum a sheep was used. The time required to raise the agglutinins to the required strength was about four weeks. It was done by inoculating the animal first with small doses of dead bacilli and later with three or four c.c. of a living broth culture. About five injections were given in the period. The reaction was very slight and did not appear to affect the general health of the animal at all. If a local abscess can be raised the agglutinins appear more quickly, such abscesses do not tend to pus formation. The injections may be either subcutaneous or intravenous. At the end of that period the strength of the agglutinins should be raised to a point where a dilution of the serum 1 in 320 will just bring about reaction. It should be noted here that if the inoculations be neglected after this stage has been reached, the agglutinins are quickly lost, and once lost, are difficult to raise again, which makes one wonder whether second inoculations for plague are of any use, if a considerable time has elapsed since the first dose, or doses. A thick emulsion of plague bacilli is then made up in a known volume of normal saline. The emulsion is then counted and centrifugalised in an electric centrifuge for some time, the supernatant fluid is then poured off and a few c.c. of the sensitising serum added. The mixture is then shaken up a little by hand and left to stand at room temperature for 24 hours, after which it is again centrifugalised for a short period and the supernatant fluid again poured off. It is then made up to its original volume with saline, and put into a mechanical shaker for a considerable period, after which it may be diluted down to any required strength: 50 million to the c.c. is a good strength for stock.

If mechanical shakers and centrifuges are not available, the sensitising serum may be added to the original emulsion and the mixture left for a longer period as the serum will, of course, be more dilute. In this case glass beads should be used for breaking up the agglutinated mass, though the dosage will not be so accurate.

Agglutination appears to be a very fair test of sensitisation, but the two processes are not necessarily the same.

Sterilisation is carried out last of all, 60 degrees for half an hour; after which it is, of course, tested for sterility both ways.

Dosage.—In the majority of cases under consideration graduated doses of 10, 20 and

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50 million were used, given on successive days, but it is recognised now that this procedure was too timid. It is now recommended that the initial dose should be nearer 50 million for an adult and no ill results need be apprehended. No ill effects were experienced in any case, either local or general. Even children of 12 years took the larger doses as well as adults. Indeed, in a disease like plague there is every reason for pushing the vaccine as rapidly as possible, as a fatal issue is often only a matter of a few hours. It is anticipated that much larger doses will eventually come to be used as a routine. Needless to say it should be given as soon as possible after diagnosis.

Results.—In dealing with the results of inoculation only the Mardan epidemic will be considered here, not because it has not been tried elsewhere, but because all the cases were treated under more or less the same conditions and, therefore, the issue is less likely to be confused by other factors. It is unnecessary to state that no really valuable conclusions can be drawn from the few cases quoted here, but the figures have a value as an indication of the sort of result that one might obtain if the vaccine were tried on a larger scale, and it is in the hope that some one with better qualifications and opportunities than the authors will do so next spring that this article has been written.

In trying to estimate the value of the vaccine a number of different factors have to be taken into consideration. The most important of these is undoubtedly the effect of prophylactic inoculation. There can be no question that the severity of the disease is enormously reduced in those persons who are unlucky enough to contract the disease after inoculation. Other factors are proper nursing and feeding in a hospital as opposed to the usual village hovel, coincidence, the effects of intercurrent disease, in which the vaccine was peculiarly unfortunate, and lastly the effects of other forms of treatment. Some charts have been altogether cut out of the series owing to the impossibility of excluding these other factors, in every case their inclusion would have made the results of the vaccine more striking, so that the authors should not be accused of too much optimism.

The figures for this particular epidemic work out as follows:—

(*a*) Of those who were *not* prophylactically inoculated and who *were* treated with the sensitised vaccine—5 died out of 17=29.4 *per cent.*

It should be pointed out, however, that of the five deaths, one aborted and died of (?) heart failure three days after the temperature had come down to normal following the use of the vaccine, two had pneumonia as a complication, and one died within a few hours of receiving the first and smallest dose, being practically moribund on admission.

(*b*) Of those who were *not* prophylactically inoculated and who *were not* treated with the sensitised vaccine—11 died out of 18 = 61.1 *per cent.*

(*c*) Of those who *were* prophylactically inoculated and who *were* treated with the sensitised vaccine—1 died out of 12 = 8.3 *per cent.*

(*d*) Of those who *were* prophylactically inoculated and *were not* treated with the sensitised vaccine—the mortality was 12.5 *per cent.*

The figures given under category (*d*) were taken from a text book and not from the epidemic under consideration; they are put in to make the parallel more complete.

The authors are specially indebted to Asst. Surgeon D'Silva who carried out all the manipulatory part of the manufacture of the vaccine, and also to the A. D. P. H. of the N. W. F. Province in whose laboratory the vaccine was made. They are also very greatly indebted to Capt. H. K. Datta, I.M.S. and S. A. S. Vadara who very kindly supplied the charts and notes on the cases.

Illustrative Cases.

Case No. 1.—Faquir Hussain, private case, aged 12. *Not inoculated against plague.* Bubo in the left groin. He had been ill three days when first seen and was in great pain, and very drowsy. The bubo suppurated and was opened on the 9th day. There was no local reaction to the vaccine. Other routine treatment was given. The patient recovered.

Case No. 2.—Ali Zaman, sepoy, 2nd Guides, aged 20. *Not inoculated against plague.* Patient's condition on admission was fairly good. His temperature came down very soon. There was no local reaction to the vaccine. He was given routine treatment in addition. The bubo suppurated.

Case No. 3.—Wife of private case, aged 38. *Not inoculated against plague.* Had fever first on 20th October 1923, and slight pain in the left groin. Bubo appeared on 21st October 1923. The pulse on my visit was quick and of moderate volume and tension. The patient was put on brandy and cardiac stimulant mixture, and equal parts of tinct. and lint. iodi applied locally b.d. After the first dose of sensitised vaccine the pulse became stronger and less frequent. After the second dose the restlessness experienced at night diminished, tinct. iodi m. 5 was injected into the bubo. After the third injection of the vaccine the pulse was much stronger and less frequent than before, and the temperature came down by lysis. Later on she used to get a slight temperature in the evenings, quinine grs. 10 t.d.s. was administered, she recovered.

She developed another bubo above the first on the sixth day of the disease, which subsided of its own accord in three days' time. This did not cause any constitutional disturbance.

There was no local reaction to the vaccine.

Case No. 4.—Basak Ram, private servant, Guides Cavalry, aged 18. *Not inoculated against plague.* Patient's condition was fairly good on admission. He showed much improvement after the second dose of vaccine. There was no local reaction. The bubo subsided without suppuration. Other routine treatment was also given. The patient recovered.

Case No. 5.—Nahil Singh, sepoy, 1st Guides, aged 21. *Not inoculated against plague.* Patient's condition on admission was not promising. The patient did very well with the sensitised vaccine, his general condition

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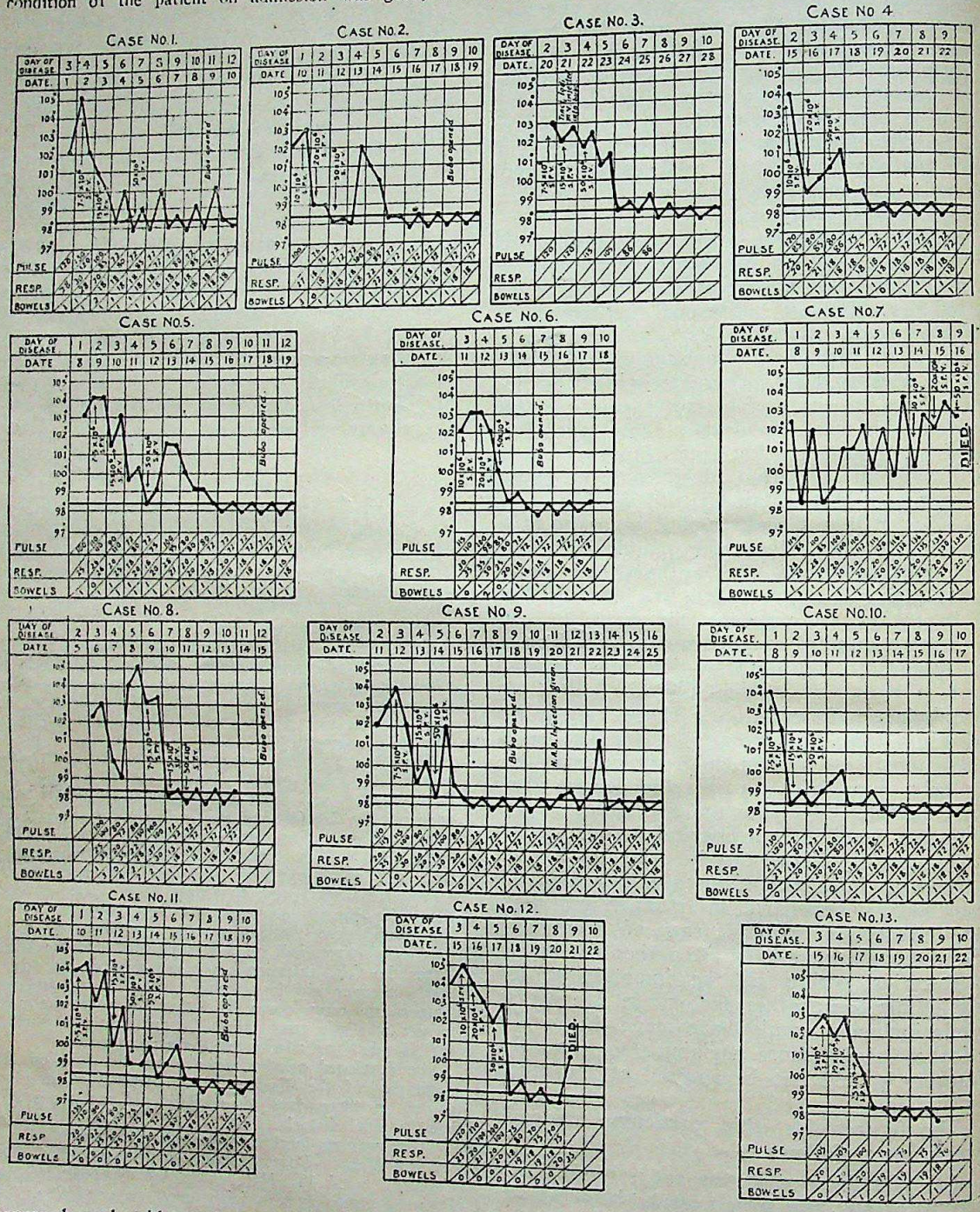
improved gradually and the temperature came down by lysis on the 5th day of the disease. There was no local reaction. Other routine treatment was given as well. The bubo suppurated. The patient recovered.

Case No. 6.—Wife of Said Umar, Mess mali, Guides, aged 25. *Not inoculated against plague.* The general condition of the patient on admission was good, and improved much with vaccine treatment. The temperature came down to normal after the third dose. There was no local reaction. Other routine treatment was given as well. The bubo suppurated. The patient recovered.

Case No. 7.—Faquir Khan, sepoy, 1st Guides, aged 26. *Not inoculated against plague.* The patient came to hospital on 8th October 1923 with fever, and was admitted as a pneumonia case on 10th October 1923; he developed a bubo and was taken to the plague camp on 11th October 1923.

His condition on admission was bad and gradually became worse. He was given digitalin injections and strychnine in addition to the routine treatment for plague. The sensitised vaccine treatment started late in this case. There was no local reaction to the vaccine. The patient died on 16th October 1923.

Case No. 8.—Brij Lall, Hindu male, aged 30. *Inoculated against plague on 3rd October* 1923. He came to hospital on 5th October 1923 with a small bubo in the left groin. The general condition of the patient at the time of admission was fairly good. He became slightly worse on the 5th day of the disease but soon



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improved. Routine treatment was given in addition to the sensitised vaccine. The bubo suppurated and was opened on the 15th day of the disease. The patient recovered.

Case No. 9.—Kishan Singh, recruit, 2nd Guides, aged 25. *Inoculated against plague on 3rd October* 1923. The general condition of the patient on admission was good and remained good throughout. The bubo was in the left groin. The bubo suppurated.

The patient developed secondary syphilis and was given a dose of N.A.B. The patient recovered.

Case No. 10.—Kalu, sweeper, 1st Guides, aged 25. *Not inoculated against plague.* Bubo on the right side of the neck. The general condition of the patient was good on admission, but the pulse was quick. He came to hospital on the first day of the disease. After the first injection of sensitised vaccine the temperature fell to normal, and the pulse improved.

Other routine treatment was carried out. The bubo suppurated. The patient recovered.

Case No. 11.—Gurra, sepoy, 1st Guides, aged 25. *Not inoculated against plague.* Bubo in the right groin. The general condition of the patient on admission was fairly good. The first injection of the sensitised vaccine brought the temperature down and it ultimately came down by lysis, and the pulse improved. The bubo suppurated. Other routine treatment was given as well. The patient recovered.

Case No. 12.—Wife of Karm Chand, private case, aged 20. *Not inoculated against plague.* Bubo in the left groin. On admission the pulse was 120, temperature 105° F., drowsy. Was first seen on the third day of illness.

16th November 1923.—Tongue was black with fur, but the patient was feeling a little better.

17th November 1923.—Condition the same, has developed another bubo in the left femoral space.

18th November 1923.—Temperature came down to normal, and patient feeling better.

21st November 1923.—On the night of the 20th an abortion took place, no one was attending the case properly and she fell from her charpoy. She died at noon.

Case No. 13.—Tara Chand, private case, aged 10. *Not inoculated against plague.* Two buboes in the groin (left). On admission the pulse was 105, temperature 103° F., drowsy.

15th November 1923.—Was feeling better and complaining of great thirst.

17th November 1923.—This evening the temperature came down to normal.

21st November 1923.—The patient was feeling better, no pain in the buboes, but complained of a little pain in the arm where the vaccine was injected.

The patient recovered.

Corrigendum.—In the list of contributors in the index to volume lviii, for Stoker, C. J., please read Stocker, C. J.

THE USE OF INTRAVENOUS INJECTIONS OF IODINE IN THE TREATMENT OF SEPTICÆMIA AND OTHER SEPTIC CONDITIONS.*

By F. P. CONNOR, D.S.O.,

LIEUT.-COLONEL, I.M.S.

MY first experience of the value of intravenous injections of iodine in the treatment of certain pathological conditions dates back to the winter of 1910 to 1911. The report of my early cases is contained in the *Journal of the London School of Tropical Medicine,* Vol. II, 1912-1913, page 148. These early experiences were confined to bubonic plague, which was then prevalent in epidemic form in the Gaya District of Bihar and Orissa.

The first case treated was an Indian police constable, who was admitted into the police hospital at Gaya suffering from plague. Plague bacilli were found in smears made from the fluid drawn from the enlarged femoral glands and were also present in the peripheral blood. The patient was semi-conscious and had a temperature of 104° F. My previous experience of cases as far advanced as this was that they all died.

An intravenous injection of tincture of iodine, m. vii, diluted with distilled water, one drachm, was given and repeated twice the same evening. An improvement in the patient's condition having followed, three more injections were given on the following day. The crisis was passed, and though extremely weak and ill for some days, the convalescent stage was reached, and after suppuration of the femoral bubo the patient recovered.

This case impressed me very much and other cases were treated similarly and are recorded in the article referred to above. Outside the hospital it was found that some cases died a few days after the acute attack had subsided, apparently from sudden heart failure. This is the case in all very acute specific fevers when the patient attempts to get up too soon.

My conclusions at that time were that, firstly, iodine employed in this way had no prejudicial effects on human beings, and, secondly, that it had a distinct effect in helping to save the lives of cases of bubonic plague.

I had at that time no previous knowledge of the effects of intravenous injections of iodine in man or animals, but I was able to ascertain (through the kindness of the late Sir Lauder Brunton, Bart.) that experiments with large doses of iodine, on direct injection into the blood stream, had been made by Boehm and Berg, and had resulted in œdema of the lungs, much hæmorrhagic exudation into the pleura and great engorgement of the kidneys. Also that Davaine had found that, when added to septicæmic blood, iodine destroyed its infective quality in the proportion of 1 in 10,000. Somewhat similar results were obtained by Krajewsky with the blood of anthrax cases.

It was rather hard to believe that less than one drachm of tincture of iodine, injected intravenously in such small doses could combat so severe an infection as plague. But one knows of the enormous value of the

* Being part of a paper on "Some Surgical Points of Interest" read at the meeting of the Medical Section of the Asiatic Society of Bengal on the 12th of December 1923.

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minute amount of iodine present in the thyroid secretion and the results of the above-mentioned experimental work were encouraging.

Ever since 1913 the use of intravenous iodine has become one of the routine methods of treatment of surgical cases of sepsis in my wards, and particularly of such grave cases as gas gangrene, severe streptococcal infections, etc. It is very hard to build up statistics of any value in dealing with such cases. Some of the worst cases recover under any ordinary method of treatment, while some will die in spite of all the methods at our command. At the same time my clinical experience has confirmed my conviction that the intravenous injection of iodine is of value in the treatment of these cases.

During the year following my initial experience of the iodine treatment for plague, the beneficial effects of very small and frequently repeated doses of tincture of iodine by the mouth were widely circulated in the newspapers. This was done, if I am not mistaken, at the instance of some of the workers in the Salvation Army. What the results of this treatment were, I am not in a position to say.

In my own experience of the last ten years, I have not been tempted to increase to any extent the amount of iodine injected at one dose. I have on many occasions increased the number of doses per day and have continued the treatment for several days at a time. It has always seemed to me that even small doses had a considerable effect, and this is intelligible, considering the powerful stimulus which iodine exerts on the thyroid mechanism and probably on other less well-understood mechanisms of the body. Further experimental work is badly needed, as also an investigation into the actual bactericidal power of iodine in the blood of human beings suffering from septicæmic conditions, such as infectious fevers, pneumonia, anthrax, syphilis and many more. My own experience has been almost entirely clinical and has been confined for the most part to so-called surgical cases of grave sepsis.

I was extremely interested to read the results of a great deal of independent work done by Lt.-Colonel W. W. Jeudwine, C.M.G., I.M.S., on this identical subject (*Indian Medical Gazette*, December 1923). We badly need more clinical work of this kind and work in the pathological laboratory also.

Jeudwine has employed intravenous iodine for a large number of affections, most of which have been what would be described clinically as of "septic" origin. He is evidently much impressed with the value of the treatment. He describes some of the details of his technique in administration and mentions certain difficulties, such as local thrombosis, pain, reaction, iodism. He tells us how most of these can be avoided. I can find no mention of the effects of this method of treatment on syphilis in any of its stages. Considering the marvellous effects of potassium iodide on some of the manifestations of syphilis, intravenous iodine may well be worthy of a trial.

I am informed that no beneficial effects have so far been obtained in cases of kala-azar and of malaria by employing this method of treatment. The long-continued leucocytosis, referred to by Jeudwine, was not observed in these cases.

My object in writing this paper is to draw the attention of other workers to the possibilities of iodine, used in this direct manner, in the treatment of disease. My own knowledge and experience are insignificant and are offered only as a small contribution to the subject.

In the discussion on Colonel Connor's paper Major H. W. Acton, I.M.S., pointed out that one grain of iodine diluted in 5 litres of blood could not possibly act as an antiseptic. He considered that Colonel Jeudwine's results were largely hit and miss. Where hypothyroidism was present, the iodine injected supplemented a deficiency, stimulated the production of thyrotoxin, and was thus of great benefit. The types of appendicitis, for instance, could be classified into (*a*), those with hyperthyroidism, where there ensued a hyper-leucocytosis and abscess formation; and (*b*) those with hypo-thyroidism, where there was no such leucocytosis, and where gangrene often set in. He had recently been studying the action of pressor bases in animals who had been deprived of the thyroid gland, and the results were of great interest. Thus some bases which often acted for only 3 to 4 minutes in the presence of the thyroid, might act potently for from 10 to 15 minutes in its absence. Probably the intravenous iodine action was related to the thyroid mechanism.

Dr. Bepin Gupta would substitute "endocrinism" for other treatments, try iodine intravenously in kala-azar, and considered that the Mount Everest expedition owed its success—(or want of it)—to the fact that its members wore beards which protected their thyroid glands!

Dr. U. N. Brahmachari said that he had tried iodine (Iodo-injectule, Robin) intravenously in kala-azar with complete failure. On the other hand he had had encouraging results with it in influenzal septicæmia and in post-influenzal pneumonia. Also with Crook's colloidal iodine intravenously.

Major R. Knowles, I.M.S., stated that intravenous iodine had been tried in cases of kala-azar and of malaria at the Calcutta School of Tropical Medicine, with completely disappointing results. There was no evidence of the hyper-leucocytosis mentioned by Colonel Jeudwine, as a result.

Lieutenant-Colonel J. W. D. Megaw, I.M.S., pointed out that the doses used at the School in these cases had been only 10 to 20 minims of the tincture, and considerably smaller than those advocated by Colonel Jeudwine.

In summing up the discussion, Colonel Connor said that the claims for the drug in septic conditions were very interesting; but obviously much further study was needed. For instance, if its activity depended upon the thyroid mechanism, small doses might be better than large ones.

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LIVER FUNCTION TESTS AND CARBON TETRACHLORIDE.

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and
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VARIOUS methods have been described from time to time for testing the functional activity of the liver. It is not the object of this paper to describe all these in detail. There is, for instance, among others, Rosenthal's method(1) of testing liver function by injecting phenol-tetrachlor-phthalein and studying its rate of disappearance from the blood stream. The liver is practically the only organ that excretes this dye, and when the liver is normal, the rate of disappearance of phenol-tetrachlor-phthalein is quite rapid. This method was given an extensive trial by later workers such as Kahn and others, but their reports show results which are conflicting and this method has consequently not met with extensive clinical application.

Salicylic acid has also been used for testing liver functions, the results being based on the rate of its excretion in the urine. This test was given a fairly extensive trial by one of us (J. P. B.), but the results obtained were not very encouraging.

Perhaps the first experiment on testing the functional activity of the liver based on one of the most important functions that the normal liver has got to carry out, viz., the glycogenic function, was started by de Fellipi.(2)

He found that when the liver was shut out from the portal circulation, there was a small decrease in tolerance for dextrose, but a larger decrease in tolerance for lævulose.

Jacobson(3) repeated these experiments on dogs and got the following results:—

	Before operation.	After operation.
Tolerance for dextrose	115 grammes	80 grammes
Tolerance for lævulose	90 grammes	9 grammes

Another sugar, galactose, was also employed by R. Bauer for chemical diagnosis of the condition of the liver in the living patient. It was found by experiment that when 30 to 40 grammes of pure galactose was given by the mouth to a healthy normal individual there was no galactosuria, but that in certain disturbances of the hepatic function an appreciable portion of it appeared in the urine. According to Bauer, the test is positive in the various forms of cirrhosis of the liver, in catarrhal jaundice, in phosphorus poisoning, in acute yellow atrophy and fatty liver, in tuberculosis; but in passive hyperæmia of the liver, in cholelithiasis, cancers, tumours, echinococcus disease and abscesses and in perihepatic affections it is said to be negative. This test has, however, the disadvantage that it is a urine test, and the threshold value of the excretion of galactose in the urine varies widely in different individuals.

Strauss(4) used lævulose as a test for liver function and found that 90 per cent. of patients with diseases of the liver, such as cirrhosis, excrete lævulose after a dose of 100 grammes. In acute phosphorus poisoning about 85 per cent. of the cases showed a diminished tolerance after a dose of 100 grammes. These experiments, however, suffered from the defect that the conclusions were based on the results of testing the urine for sugar only after the patient had received a large dose of lævulose by the mouth. Recent experiments on the increase of blood-sugar concentration brought about by the ingestion of carbohydrates point to the conclusion that the degree of hyperglycæmia produced is more important than glycosuria.

Bergmerk(5) in 1914 observed the effect of lævulose on the blood-sugar in normal individuals and found that practically no rise occurred after a dose of 50 grammes.

McLean and de Wassolow(6) repeated these experiments and found that a dose of 50 grammes caused a rise from 0.1 to 0.11 per cent. which is within the limits of experimental error. These observers point out that the only sugar in ordinary use which did not produce a rise in blood-sugar concentration after its ingestion was lævulose, and they made use of this observation in testing the liver efficiency in various cases, on the supposition that a defective liver mechanism would result in lævulose hyperglycæmia.

One of us (J. P. B.) experimented on himself on more than one occasion and found that there was no definite rise in the blood-sugar concentration after a dose of 25 grammes of lævulose. When plotted graphically, the blood-sugar curve was represented by a continuous straight line (Chart I, A.). Of course a variation of 5 to 10 milligrammes per 100 c.c. may give rise to slight oscillatory deviations in the blood-sugar curve, but this is within limits of experimental error.

This experiment was repeated on 25 healthy individuals and the results obtained confirmed the previous experiment. This test was subsequently tried on cases of definite hepatic diseases, clinically diagnosed as cirrhosis of the liver, salvarsan-jaundice, acute yellow atrophy, etc., and in every one of these cases the test revealed an impairment of the functional capacity of the liver by showing a definite rise in the sugar content of the blood. This test was also tried on a few cases of infantile cirrhosis of the liver and a very high

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degree of liver damage was revealed in two cases which ultimately proved fatal (Chart I, B.).

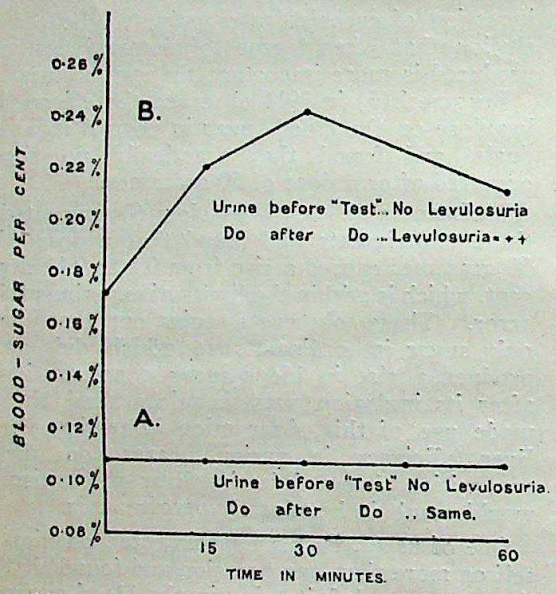
The explanation of why a dose of lævulose will cause no rise in the blood-sugar content, whereas a similar dose of glucose will cause a rise, may lie in the supposition that in the case of lævulose, the sugar after absorption from the alimentary tract is very readily taken up by the liver and stored as glycogen so that none of it can get into the systematic circulation. If the functional activity of the liver be diminished in any way, e.g., by degeneration of the hepatic parenchyma which is so often seen in such cases as salvarsan-jaundice, it will not be able to deal with the 25

CHART I.

Lævulose tolerance curves.

(A) Normal curve.

(B) Curve of impaired liver function.



or 50 grammes of lævulose presented to it; part of it being still converted into glycogen, (depending on the extent of damage of the liver parenchyma), and part escaping to the general circulation, causing thereby a rise in the blood-sugar concentration. Thus by doing a lævulose tolerance test, i.e., giving the patient a certain dose of lævulose by the mouth and examining the blood for sugar before, and at intervals of 15 minutes for one hour or an hour and a half after the test meal, and plotting the results on graph paper,(5) one can easily get results which will demonstrate the condition of the liver, normal or otherwise. In a perfectly healthy individual, as stated before, there should practically be no rise, and the blood-sugar curve should be a straight line.

Glucose on the other hand is not stored as glycogen in the liver as rapidly as lævulose, and the same holds with some of the other sugars, such as galactose, etc. Even in healthy individuals, part of these pass through the liver into the general circulation without change, thus causing a rise in the blood-sugar concentration which persists for about half an hour or so. Their subsequent disappearance from the blood stream is probably due to a carbohydrate-storage-utilization-mechanism which seems to act effectively about 15 to 30 minutes after the ingestion of the sugar.(7)

Action of carbon tetrachloride on the liver.—Since the introduction of carbon tetrachloride in the treatment of hookworm disease by Maurice C. Hall,(8) much has been written about the toxicity of the drug.

Lake(9) reports that a monkey receiving a total quantity of 60 c.c. during a period of 30 days showed no changes in any organ on post-mortem ascribable to carbon tetrachloride. This monkey received 40 times the indicated dose per kilogramme as compared with man and this dose was repeated 12 times within a period of 30 days.

Smillie and Pessoa(10) came to the conclusion that carbon tetrachloride in large doses has a toxic action upon the host, similar to that of chloroform. A serious manifestation is fatty degeneration of the liver, which first manifests itself two to three days after the treatment.. This condition, however, is rare and is seldom fatal.

Leach,(11) however, gave as much as 10 c.c. to a condemned criminal followed a week later by 2 c.c., without producing serious symptoms. On post-mortem examination 20 days later, he observed no macroscopic lesions of the liver. Another criminal, given 10 c.c., showed on post-mortem marked congestion of the liver.

Nicholls and Hampton(12) gave 12 c.c. to a criminal who was executed 4 days later and no liver necrosis was found.

Docherty and Burgess(13) reported granular degeneration of the liver cells and leucocytic infiltration in one case after a single dose of 5 c.c.; and fatty degeneration of liver cells and diffuse leucocytic infiltration in another, after 5 c.c., followed two weeks later by 3 c.c. Docherty, however, makes no mention of the purity of the drug which he used.

Meyer and Pessoa(14) gave carbon tetrachloride to 25 dogs, the doses varying from 0.05 to 3 c.c. per kilogram of body weight and noticed on post-mortem marked fatty degeneration of the liver in no less than 15.

Hampton(15) administered to a condemned criminal 6 c.c., repeated the same dose two weeks later, and four days after the last dose no change in the liver could be detected on post-mortem.

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Lambert,(16) in his observations on 50,000 persons treated with carbon tetrachloride, records 3 deaths. It is remarkable that two of these were children, one aged 5, another aged 7. Necropsy revealed petechial subcapsular hæmorrhages in the liver, and very severe necrosis of the central and intermediate zones of the lobules. It is also a remarkable fact that all these three were heavily infected with ascarids also.

Chopra and McVail(17) state that frequently repeated doses of 0.5 to 1.6 grammes per kilo of body weight appear to have a toxic effect on the liver cells of dogs. They have given even 3.2 grammes per kilo, however, without causing any permanent damage to the liver.

Lamson and McLean(18) studied the toxic effect of carbon tetrachloride in dogs by means of the phenol-tetrachlor-phthalein liver function test. They found that administration of 2 c.c. per kilo produced no demonstrable disturbance in the liver, whereas single doses of 4 c.c. per kilo produced functional disturbance, with complete return of function to normal within 96 hours. They also found that 4 c.c. per kilo, given in divided doses of 2 c.c. at a 48-hour interval, have no toxic effect.

Docherty and Nicholls(19) have recently reported three autopsies on condemned criminals following carbon tetrachloride treatment. They all received 4 c.c., followed in 2 hours by 2 ozs. of a saturated solution of Epsom salts. None of the patients made any complaint. They were executed three days after treatment and in two of them fatty degeneration of the liver was found.

On the other hand Caius and Mhaskar(20) state that a maximum dose of 5 c.c. is non-toxic to man.

Such are the conflicting statements as regards the action of carbon tetrachloride on the liver. To determine whether any functional disturbance of the liver is caused by *therapeutic doses* of carbon tetrachloride, one of us (J. P. B.) performed lævulose tolerance tests on some uncomplicated cases of ankylostomiasis, treated at the Carmichael Hospital for Tropical Diseases, Calcutta, under the direction of Dr. J. Borland McVail. The cases were selected at random and were treated on the lines advocated by McVail; i.e., pure carbon tetrachloride minims 70 with a purge (preferably an ounce of saturated solution of mag. sulph.) constituting a single adult dose and repeated the next day. The course is repeated, if necessary, after seven days. The results of 8 cases are tabulated below:—

It will be seen from the above table that pure carbon tetrachloride (free from carbon disulphide and phosgene), given in therapeutic doses as indicated above, has no damaging effect on the liver whatsoever. Further it is interesting to note that the two cases in the above table which showed a slight deficiency in the functions of the liver before the treatment showed no further deficiency after a full course of carbon tetrachloride.

TABLE I.

Case No.	No. of hookworm ova on one slide before treatment. (Clayton Lane's method.)	Hb. %.	LÆVULOSE TOLERANCE TEST.		Interval between last dose of CCl_4 and lævulose tolerance test.
			Before treatment.	After treatment.	
183	1,549	20 %	Normal ..	Normal (after 2 courses of CCl_4).	4 days.
206	9	70 %	Normal ..	Normal (after 1 course) ..	18 days.
209	33	30 %	Normal ..	Normal (after 2 courses) ..	1 day.
233	298	35 %	Slight impairment.	Slight impairment (after 1 course).	12 days.
241	12	30 %	Normal ..	Normal (after 1 course) ..	3 days.
246	476	30 %	Normal ..	Normal (after 1 course) ..	8 days.
258	359	35 %	Slight deficiency	Slight deficiency (after 1 course).	13 days.
				Almost normal (after 2 courses).	6 days.
264	23	55 %	Normal ..	Normal (after 1 course) ..	5 days.
270	170	50 %	Normal ..	Normal (after 2 courses) ..	10 days.

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THE DETERIORATION OF INSULIN IN INDIA.

By H. STOTT, M.D., M.R.C.P.,
MAJOR, I.M.S.,
Professor of Pathology, Lucknow University, and Physician, King George's Hospital, Lucknow.

AN EXPERIMENT OF 6 MONTHS' DURATION, WITH ONE BATCH OF BRITISH INSULIN, NOW 8 MONTHS OLD, TO ILLUSTRATE ITS EXTENT OF DETERIORATION.

ALMOST a year ago through the interest and courtesy of the Medical Research Council, London, it was arranged that an early supply of insulin should be available for investigation in this country. A batch of British insulin was finally obtained which was issued in May and received in Lucknow in early July 1923. This batch had not been protected in any way from climatic influences either on its passage to India, or during its retention by the Bombay customs, or after its arrival in Lucknow, where it was stored in an ordinary drawer of my desk.

Amongst other investigations I planned was the one here reported as to the extent of the deterioration of insulin thus unprotected throughout an Indian hot weather. The patients were under my care in King George's Hospital, Lucknow. The dietaries were carefully prescribed and charted daily according to their carbohydrate, protein and fat values. Daily urine examinations were undertaken and the grammes of urinary sugar excreted in each 24 hours charted. The patient's daily glucose balance (i.e., the difference between the glucose food intake and the glucose urinary output) was thus in each case determined daily. Daily blood sugar estimations (Maclean's method) were also recorded, this part of the work being undertaken by Dr. Sen Gupta, Research Scholar in the Department of Pathology, who concentrated his whole attention to this one point.

I will not record the details of the individual cases, nor describe the amount of labour which was given to this purpose. I will content myself with briefly recording the average monthly glucose equivalent (i.e., grammes of urinary sugar metabolised by one unit) of this insulin subsequent to its arrival in India. The total number of cases so far treated is 12, the number of units of insulin used is approximately 2,000. The average glucose equivalent of one unit of freshly imported insulin for the mild Indian diabetic patient of these parts appears to be about 12 grammes of urinary sugar. The attached table shews the glucose equivalent through successive months—together with the observed factor of deterioration of its potency.

Month of experiment.	No. of grammes of urinary sugar metabolised by 1 unit of insulin.	Potency.
(Freshly imported insulin)	12	1(12|12)
August 1923 ..	6	6|12
September ..	5	5|12
November ..	2	2|12
December ..	8|10	1
January 1924 ...	9|10	(approx.) 1|12

Judged by our carefully planned clinical and biochemical tests, the deterioration of this unprotected sample of insulin has reached in 8 months (inclusive of an Indian hot weather) the very large fraction of 11|12ths of its full value, so that its potency is now only 1|12th of the standard value.

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In December 1923, I sent a sample of this insulin to Major Taylor, I.M.S., Director of the Pasteur Institute of Burma, who was kind enough to examine its potency by animal experiment.

He reports "Although this insulin has deteriorated in potency, it is better than any other sample I have tested. Five rabbits each of 1,000 grammes weight were used after starving for 24 hours. The first four were given 3, 6, 10 and 20 units intravenously. The fifth rabbit was given 40 units. One hour later its blood sugar had fallen to 0.075 per cent. and at 1½ hours was 0.035 per cent. At this time it became very weak and lay on its side breathing rapidly. At 3 hours it had one convulsion and it died at 5 hours. Taking the unit at 1|3 of the convulsing dose for a rabbit of 1,000 grammes the potency would be 3|40 of the standard."

That is, animal experiment has indicated that this insulin after 7 months had deteriorated to between 1|13th and 1|14th of its standard potency. There is thus marked agreement between our clinical and biochemical findings on the one hand and the results of the rabbit convulsing test dose on the other.

I deem it of importance to publish these figures without delay, for with similar evidence from the Pasteur Institute, Rangoon, from the Calcutta School of Tropical Medicine and from the King Edward Medical College, Lahore, it must be assumed that insulin in India does deteriorate until it be proved (if proved it be) that the supplies at present manufactured prove more stable than the supplies which have so far been investigated. The question of the means for the prevention of the deterioration of insulin during the ensuing Indian hot weather becomes a matter of great moment.

Two immediate steps are required:—Firstly, research authoritatively by the Government Bacteriological Department, supplemented by independent research workers as to the monthly deterioration (if any) of a given original batch of insulin, a control half being kept in cold storage, and the experimental half being exposed unprotected to the hot weather. Secondly, if deterioration of present supplies be still proved, then adequate control (secured by law) must be established for the cold storage of insulin, both during importation and subsequently in large centres from whence those who so desire can secure insulin of undoubted full potency. Meanwhile insulin should be stocked, wherever possible, in cold storage—and we should be well advised to prescribe and use solely insulin which we know has been so stored right up to the time that it is actually required. It will be noticed that as regards the future there is a possibility of the deterioration of insulin being less marked than in the past for there are already indications that the newer samples of British insulin as well as being more potent are more stable than was formerly the case.

THE DOSAGE OF SODIUM CACODYLATE INTRAVENOUSLY.

By Dr. D. M. VASAVADA,

Assistant Surgeon, Bikaner.

SODIUM CACODYLATE is one of the most frequently used organic salts of arsenic, with the exception of salvarsan, in fact it was the fore-runner of salvarsan. Before the days of the latter drug this was the most extensively used of the arsenical preparations. It was given orally and more often subcutaneously at short intervals to get the desired effect. On referring to the literature about it I find that the dose recommended for subcutaneous injection is very small, from one-half a grain to 3 grains and ampoules of these strengths only are still available on the market. Experiments on animals have shown, however, that timidity in the use of this drug is groundless and that it can be tolerated in very large doses without toxic effects. The Americans have made use of this fact, and have been giving as much as 30 grains twice a week for 6 to 12 injections without any ill effect. Encouraged by their experience I also tried this drug in 15-grain doses twice a week intravenously in anæmia, sprue, syphilis, chronic bronchitis, psoriasis and in fact in every condition where I thought that arsenic was indicated. The results in a large number of cases were striking. My dread of its toxicity is gone. There were some cases in the wards suffering from primary and secondary anæmia receiving minute doses of the cacodylate, i.e., 2 grains on alternate days. A single dose of 20 grains followed by another three days later showed that the drug to be really effective ought to have been given in these doses. The patient felt better, her appetite increased and after four more biweekly injections of 15 grains each the patient wished to be discharged as she felt cured. A male patient with primary anæmia had also a similar experience. In secondary anæmia the injections were given less often to allow the system to recoup naturally.

The second batch of cases were cases of sprue with a raw tongue and profuse, large motions. The rawness began to disappear after the first injection and by the fourth there was hardly any symptom remaining, with good appetite and well digested motions. These had internal medication as well. I must here add that some of the sprue cases did not respond favourably from the start and so the treatment had to be given up. This makes me believe that possibly there are two varieties of sprue, one amenable to cacodylate and one not. I, however, leave it to others to establish the difference.

The third set of cases were cases of malarial cachexia, some of which were quinine

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resistant, as, in spite of frequent quinine injections the fever recurs off and on. These are cases well worth a trial. After a few intravenous injections of quinine bihydrobromate, 5 grains on alternate days, the cacodylate was given twice weekly. The response was immediate, the appetite improved, and the patients began to feel that their chronic illness was disappearing. About two months of this course with gradually increasing intervals between injections is all that is required to effect a cure in most cases. My experience is mostly of patients coming from Bombay, Calcutta and its neighbourhood. The quinine-resistant type so frequently met with in these areas is the one where I would suggest a trial of this drug in large doses.

The fourth class of cases to get this high dose of cacodylate were certain dry skin affections. Most of these cases responded very well, the period of treatment being much curtailed as compared with results under the old small doses system.

The fifth class of cases were those of chronic bronchitis and phthisis; cases running a chronic course. These were very favourably influenced by the injections. It requires a longer trial, however, than I have been able to give to pronounce a definite opinion as to its ultimate value. The drug should not be forgotten, however, in our armamentorium against these diseases.

My object in writing this note is to lay special emphasis on the fact that the timidity shown in use of sodium cacodylate as regards dosage is quite groundless. To be really effective it should be given and has been given in fairly large doses, from 10 to 30 grains biweekly, intravenously in 5 c.c. of distilled water without ill effects or any toxic symptoms developing, though one should always be on watch for these. Perhaps larger doses may be tolerated, but I have gone so far and have not yet given larger doses.

ON THE POTENCY OF INSULIN IN THE TROPICS.*

By JOYTI PROKASH BOSE, M.B. (Cal.),

Dr. Mitra Research Scholar in Diabetes, Calcutta School of Tropical Medicine.

SINCE the publication of the results of my experiments on insulin of American make (Lilly & Co., Indianapolis) in the *Indian Medical Gazette*, December 1923, I have tested the potency of other brands of insulin which have since made their appearance in the Indian markets. The lines indicated by the Medical Research Council of England for the pharmacological assay of insulin have been strictly followed, and rabbits of prescribed weights (fasting for not less than 24 hours) have been used for the tests. Two or sometimes three rabbits were used for each experiment in order to do away with any error resulting from the natural variations in rabbits.

The results obtained are given in the following table:—

TABLE.

Date of test.	Brand of insulin tested.	Weight of rabbits in grammes.	Hours of fasting before test.	No. of units injected.	Blood-sugar before injection.	Blood-sugar 1 hour after.	Blood-sugar 3 hours after.	Percentage of maximum reduction of blood-sugar.	REMARKS.
21-11-23	A. B. batch 243, Oct. 1923. Fresh lot brought by Mr. Grimshaw.	1910	36	6	0·128%	0·106%	0·078%	39·1%	No convulsions
21-11-23	Do.	1876	36	15	0·104%	0·09%	0·06%	42·4%	do.
7-1-24	Do. (sent out in cold storage).	1750	24	15	0·115%	0·078%	0·059%	48·8%	do.
24-1-24	A. B. batch 258, Dec. 1923.	1880	24	6	0·120%	0·086%	0·06%	50%	do.
24-1-24	Do.	1790	24	15	0·126%	0·08%	0·052%	58·8%	do
18-12-23	Wellcome brand insulin.	1800	24	6	0·122%	0·100%	0·072%	40·2%	do.
18-12-23	Do	1890	24	15	0·112%	0·085%	0·056%	45·5%	do.
24-1-24	Do. (Fresh batch. Sent by Burroughs, Wellcome and Co., Bombay.)	1700	24	15	0·116%	0·08%	0·058%	50·0%	do.

*Further notes with regard to insulin in the tropics and letters from the British Drug Houses, Ltd., and from Messrs. Burroughs, Wellcome & Co., referring to the particular brands of insulin mentioned in this article, as well as further letters on the same subject from correspondents, will be found in the Correspondence columns of this issue on pages 165 and 166.—EDITOR, *I. M. G.*

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The conclusions one may draw from the above results are as follows:—

(1) That A. B. brand insulin, batch 243, is at least one-fourth of the prescribed original potency.

(2) That the same brand of insulin sent out in cold storage does not show any difference in results with regard to potency.

(3) That A. B. insulin, batch 258, is comparatively a more potent insulin than batch 243. The makers claim that their newest product is some 50 per cent. more active than was the former product.

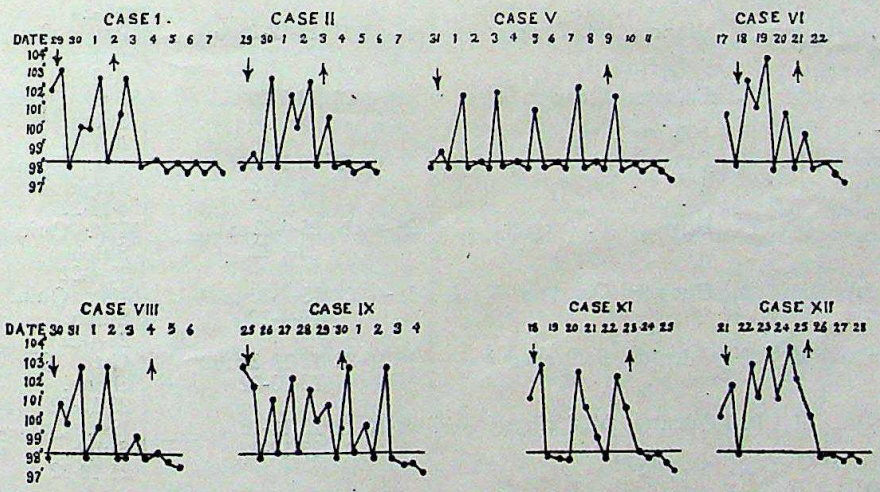
(4) That 'Wellcome' insulin yielded more or less the same sort of results as regards potency as did the other brand.

ON THE FAILURE OF *VITEX PEDUNCULARIS* IN THE TREATMENT OF MALARIA.

By R. N. CHOPRA, M.A., M.D. (Cantab.),
MAJOR, I.M.S.,
R. KNOWLES, B.A. (Cantab.), M.R.C.S., L.R.C.P.,
MAJOR, I.M.S.,
and
Asst. Surgeon J. C. GUPTA, M.B. (Cal.)
From the Calcutta School of Tropical Medicine.

IN an article published in the *British Medical Journal* of the 5th February, 1921, Lieutenant-Colonel J. C. S. Vaughan, I.M.S., pointed out that the plant *Vitex peduncularis* was useful in the treatment of blackwater fever and of malarial fevers. This plant grows in Bihar, Eastern Bengal and the Central Provinces, though it is not very well known. In Hindi it is known by various names,—*Nagbail, Nagpheni, Charaigorwa, Chhagriaruba, Minjur-gorwa,* in Bengali it is called *Boruna* and *Goda.* The only reference regarding its medicinal properties by the old writers is its use for external application for pains in the chest. Vaughan, however, found that the aboriginal tribes of certain parts of Bihar were well acquainted with this plant, and used it in the treatment of malarial fevers and also of blackwater fever which sometimes occurs among them. They prepare an infusion of the leaves or of the root-bark or young stem and take it internally several times a day with much benefit. Preference is given to the dark coloured root plant over the pale coloured variety.

Vaughan tried this drug in a series of cases in both these diseases and reported that it gave very satisfactory results. He originally used the method of making an infusion employed by these tribes. This consisted in taking two ounces of fresh leaf or of leaves dried in the shade and dropping them into 40 ounces of water, boiling for 5 to 10 minutes, and then leaving them to infuse for another hour. The resulting infusion was about the colour of strong cold tea in appearance and in taste, and was given sweetened with a little sugar in doses of 8 to 10 ounces in 24 hours. Concentrated infusions prepared on the lines of infusio gentianæ compositum (concentrated) of the British Pharmacopœia were also tried by him, but the therapeutic effects were not so marked. He adopted the method of using 1, 2 and 4 ounces of leaves in 40 ounces of water to suit different cases, and the results obtained by this treatment were said to be very striking.



Arrows pointing downwards show when Vitex was started and those pointing upwards where Quinine or Cinchona Febrifuge was started and Vitex was stopped

In the latter part of 1922, the Government of Bihar sent specimens of leaves of this plant to one of us for investigation with regard to its chemical composition, pharmacological action and clinical trials. Dr. Sudhamoy Ghosh, Professor of Chemistry to the School,

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analysed the drug, and found traces of an alkaloid present. The drug was tried in a number of cases of malarial fever at the Carmichael Hospital for Tropical Diseases, closely following the instructions given by the author in the paper referred to above with regard to preparation of the infusion and its mode of administration. As our results were not satisfactory, we communicated with Colonel Vaughan, who said that this was probably due to the leaves not being collected at the right time of the year. He very kindly promised to supply us with proper specimens, and these arrived a few months later. An infusion made from these was tried in a series of cases and the details are given in the above table. It must be pointed out here that all the cases which were put on to the infusion were first examined for malarial parasites and only such cases as were positive were given the infusion. Daily blood films were taken and a careful search was made for parasites. No other drugs were administered whilst the infusion was being tried, with the exception of ordinary purgatives. A glance at the table and at the temperature charts given will show that none of our cases were benefited at all. The parasites in the blood remained quite unaffected and so did the clinical symptoms. In one or two cases the fever abated somewhat, as often happens without any treatment, but in these cases parasites were still found in the blood films.

TABLE.

The use of Infusion of Vitex peduncularis in cases of Malaria Fever.

Serial No.	Name.	Sex.	Age	Residence.	Blood findings before admission.	Date of commencing Vitex administration.	Blood findings whilst on Vitex treatment.	Date of starting specific treatment.	Blood findings whilst on specific treatment.
1	Kalipada Pradhan	M.	25	Howrah	B. T. and M. T. rings +++	29-11-23	30-11-23 ++ 1-12-23 ++	Mist. Quininæ Sulph. gr. x. ad. oz. i. 2-12-23	3-12-23, 4-12-23, 7-12-23 — Negative
2	Shib Ch. Roy	M.	39	Howrah	M. T. rings++	29-11-23	30-11-23 ++ 1-12-23 ++	Mist. Quin. Sulph. 3-12-23	4-12-23, 6-12-23, 7-12-23 — Negative
3	Narendra N. Neogi	M.	40	24-Parganas	Quartan ++	4-12-23	4-12-23 to 12-12-23 ++	Mist. Cinchona. 13-12-23	14-12-23 + ; 16-12-23, 17-12-23 — Negative
4	Bijoy K. Ghoshal	M.	30	24-Parganas	M. T. rings +	17-12-23	19-12-23, 20-12-23 +	Mist. Quin Sulph. 21-12-23	22-12-23, 23-12-23 — Negative
5	Amulya Das..	M.	23	Entally	M. T. rings and crescents+	31-12-23	2-1-24 to 9-1-24 ++	Mist. Quin. Sulph. 9-1-24	10-1-24, 11-1-24 — Negative
6	Madhu Mutt	M.	26	Madras	M. T. rings ++	18-12-23	18-12-23 to 20-12-23 ++	Mist. Cinchona. 20-12-23	20-12-23 to 8-1-24 — Negative
7	N. Mullick ..	M.	52	Calcutta	Quartan ++	16-1-24	18-1-24, 19-1-24 ++	Mist. Quin. Sulph. 20-1-24	21-1-24 to 1-2-24 — Negative
8	Abdul Rahim	M.	30	Calcutta	B. T. rings ++	30-10-22	30-10-22 to 3-11-22 ++	Mist. Quin. Sulph. 4-11-22	6-11-22 to 8-11-22 — Negative
9	Buphati .	M.	12	Howrah	B. T. rings+++	25-4-22	25-4-22 to 29-4-22 +++	Mist. Quin. Sulph. 30-4-22	30-4-22 to 5-5-22 — Negative
10	Bullar Adak	M.	26	Hooghly	Quartan +++	15-4-22	15-4-22 to 19-4-22 ++	Mist. Quin. Sulph. 24-4-22	25-4-22, 26-4-22 — Negative
11	H. N. Gupta..	M.	30	Calcutta	B. T. rings+++	18-10-22	18-10-22 to 23-10-22 ++ +	Mist. Cinchona. 23-10-22	24-10-22, 26-10-22 — Negative
12	Kantick ..	M.	22	Calcutta	M.T. rings+++	21-10-22	23-10-22, 25-10-22 +++	Mist. Quin. Sulph. 25-10-22	27-10-22, 28-10-22 — Negative.

In cases Nos. 2 and 4 the infusion had to be replaced by quinine mixture after two days' trial, as the patient started to show signs of irritation of the central nervous system. A few doses of the latter drug immediately got the symptoms under control.

Neither the asexual nor the sexual forms of *P. vivax*, *P. malariæ* or *L. malariæ*, were affected in the slightest degree. In all these cases quinine or cinchona febrifuge in the usual doses produced a rapid disappearance of parasites from the blood

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and the fever and other symptoms rapidly subsided.

Conclusions:—

(1) Chemical analysis of the dried leaves of *Vitex peduncularis* shows the presence of traces of an alkaloid.

(2) In our series of cases of malarial fever, however, caused by *P. vivax*, *P. malariæ* and *L. malariæ*, the freshly prepared infusion of dried leaves had no effect whatever on the parasites in the blood, on the temperature chart or on the other clinical symptoms.

(3) The drug appears to be absolutely useless in the treatment of malaria.

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SOME COMMON AILMENTS OF CHILDREN, THEIR IDENTIFICATION AND TREATMENT.*

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A POST-GRADUATE CLINICAL LECTURE.

GENTLEMEN,

ONE of the commonest complaints with which a mother faces her doctor is that her baby does not gain in weight, and I warn you that if your treatment is not a success she will quickly seek advice elsewhere. This condition I shall call, for want of a better name, *failure to gain*. These two babies which I show you to-day, both under the age of 12 months, are admirable examples of this condition. One mother will tell you that she has been feeding her baby on a much vaunted baby food; the other that she has been feeding hers on a mixed diet. The one infant has thrush and multiple boils, and the other has a septic discharge from the ear. Both are obviously anæmic, pot-bellied, and wasted. Now if you will listen to the answers to my questions you will hear that there is marked constipation, the stools are brittle, grey, soapy, and somewhat offensive. There is slight fever at times, and restlessness at night; the appetite is poor and the weight has been at a standstill for the last three months.

Failure to gain is exceedingly common, but the recognition of its cause is rarely diagnosed in time to prevent such complications as these infants show, with the result that symptoms alone are treated, whereas the fundamental error remains, and much time and expense is wasted. Therefore, I would advise you most earnestly to bear in mind that your success with such infants in private practice will lie in direct proportion to your remembering the facts that, roughly speaking, human milk contains protein 2 per cent., fat 3 per cent., carbohydrates 7 per cent., whereas cow's milk contains protein 4 per cent., fat 4 per cent., carbohydrates 4 per cent. Without such figures constantly in your mind it is impossible to work out where the fault in feeding has been, or how to prescribe the correct diet.

In 75 per cent. of cases the fault is in the feeding, and in 25 per cent. the fault is in the infant.

What are the common faults in feeding? They are (1) insufficient feeding; (2) too much feeding; (3) too much sugar; (4) excess of starch-containing food; (5) irregularity; and (6) the bulk of each meal is greater than the age of the infant should permit.

I need not remind you how many types of these cases there are. One day you will see a baby a few months old on pure cow's milk; another day one who has been obtaining in addition to an already liberal diet, a teaspoonful of olive oil, or two of cream, or four of heavy top milk in its feeds. Again one having a teaspoonful of sweetened condensed milk, which is equivalent (if you will measure the spoon) to 150 drops in 3 ozs. of water. The next day an infant fed according to the directions on the tin or bottle of some much vaunted dried milk food, which, if you care to work it out, you will find is equivalent to 12 per cent. carbohydrates. Another day you will see a seedy infant under 6 months of age on Bengers,' Allenbury's No. 3, or Savory & Moore's. Another day one who has been fed at any hour or time that suits the mother. Another day you will find a child of four months old having 6 or 7 ozs. feeds, and you will hear that it thrived for a time and then steadily started going down hill.

I remind you of these things because a fog surrounds the subject of infant feeding and its primary principles, which should be based on the formula of P2, F3, CH. 7, and, if you doubt my assertion that it is the digestion that is the primary cause of the complications that these two infants show, let me prove it to you by showing you a test that you may yourselves carry out in every case. Ask the mother to collect ordinarily, or if need be in a clean white mackintosh, some of the urine of the infant who *fails to gain*. In nearly every case—and certainly in these two, you will find that if you will take a sample in a test tube and will add a few drops of 5 per cent. sodium nitro-prusside, shake, and add one drop of acetic acid and then down the slanting tube add drop by drop liq. ammon. fort., you will get at the junction a rust-

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brown or purple ring,—the so-called acetone reaction; and if you like further to test the urine you can easily demonstrate indican as well. Moreover, if other proof is needed, you will find on analysing the stools that there are excessive alkaline bases and soaps therein. Whatever the error may be, the result is the same, *failure to gain*, this being due to an ill-balanced diet with lack of assimilation of fat, protein, or carbohydrates.

I have said that 25 per cent. of the causes are in the infant itself: these causes are either (1) some recent illness, such as acute enteritis, whooping cough, or measles. (2) Constipation. (3) Some glandular defect in the intestines, pancreas, or endocrines. (4) Syphilis. (5) Some rarer cause, such as pyelitis, tubercle, congenital heart disease, or anaphylaxis.

Now remember, that whatever the cause may be, the mother expects you as a doctor to find it out and to correct it. Therefore, before going into the details of treatment I would ask you to remember a few useful points, e.g., that:—

(*a*) One measured teaspoonful of separator cream in 3 ozs. milk mixture is equivalent to 5 per cent. fat.

(*b*) One measured teaspoonful of top milk in 3 ozs. of milk mixture is equivalent to 3 per cent. fat.

(*c*) A lump of butter, the size of a green pea, in 3 ozs. of milk mixture is equivalent to 3 per cent. fat.

(*d*) A lump of sugar or one level teaspoonful of Mellin's Food in 3 ozs. of milk mixture is equivalent to 5 per cent. carbohydrate.

(*e*) The milk of a cow, or goat, or if possible, of a herd of cows, is immeasurably better than any patent food, because you can then accurately feed the baby.

(*f*) If you must order a dried milk food, always order one teaspoonful less than the directions given on the tin or bottle.

(*g*) If a baby is not satisfied with the quantity of food in its bottle, increase the quality, for the stomach of a child under 6 months will not hold a greater quantity than 1 oz. over its age in months, e.g. if the baby is 4 months old, 5 ozs. should be its feed. Give lots of boiled water between feeds.

(*h*) Enquire and work out the amount of protein, fat, and carbohydrates that the baby has had up to date per feed.

(*i*) For the first three days allow no sugar whatever; you will find that mothers will resist this and say that their babies will not take their food if it is not sweet; therefore, for the first three days, until the infant is on Mellin's, add $\frac{1}{8}$ or $\frac{1}{4}$ gr. saccharine in order to make the food palatable.

(*j*) Remember that patent milk foods unintelligently used are among the curses of modern civilization, and undoubtedly become a boomerang for evil from infancy to youth, and from youth to adolescence, for I need not remind you that that immense group of symptoms which are generically classified under the heading "spasmophilia," are to a very great extent due to gastro-intestinal disturbances which have had their origin in patent rather than natural food during babyhood.

Still less perhaps is it necessary for me to prophesy that as a result of the Great War with its effect on infant dietetics, and the modern tendency of all classes of society to rely upon patent baby foods, that obstetric difficulties and anomalies will increase.

Recently a so-called authority euphoniously referred to the milk supply of India as white sewage. Such a statement is ridiculous and tends to put back the clock. Everywhere in India, mofussil or big town, reliable milk of either cow or goat can be procured. Most earnestly I would ask you, if you consider your cow's milk not reliable, to induce your patient to keep one or more goats; these animals, procurable everywhere, if tended and fed properly, give a milk supply ten thousand times better than any patent food, and at a cost infinitely cheaper.

(*k*) Always put your directions in writing.

Treatment.—This to a very large extent is entirely dietetic, and my advice to you would be as follows:—

First explain to the mother that it is most necessary to rest the digestion of the baby for 12 to 24 hours, by giving it nothing but barley water, or rice water. Then I would advise you to place the baby on skimmed milk, which is a fat-free, easily digested food, and is made by simmering milk in an open pudding basin for half an hour, remove, and put in a cool place for 2 hours, after which you will find the fat has risen as top milk. This is removed by means of a flat spoon to a depth of $\frac{1}{4}$ or $\frac{1}{2}$ an inch; the milk below is known as skimmed milk, and should be the sole diet for at least one week. The first day you will give a dilution of 1 in 3, the second day 1 in $2\frac{1}{2}$, the third day 1 in 2, the fourth day 1 in $1\frac{1}{2}$, and so on until the baby is on pure skimmed milk if it is over the age of 6 months. By similar progression you will gradually get the infant back on to ordinary cow's milk. The amount of skimmed milk given per day should be $1\frac{1}{2}$ ozs. per pound weight, that is, if the baby weighs 10 lbs. it should have 15 ozs. per day to start with. On the third or fourth day you should add to the diluted skimmed milk one teaspoonful of Mellin's Food, which, I might remind you is dextri-maltose and, therefore, an

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easily digested carbohydrate, and better than sugar. The amount of Mellin's should be given progressively up to 2 teaspoonfuls per feed. On these lines you will find that the child in a very short time rapidly gains in weight, its tongue cleans and skin clears; then, and not till then, you may gradually increase the diet to a normal and healthy optimum. Medicines are rarely needed; a mixture of paraffin, one ounce, and milk of magnesia, one ounce, of which 2 teaspoonfuls are to be given twice a day if necessary, is most useful. Fruit juices should be given as usual,—not less than 1 ounce per day.

I do not think that in *initial* stages grey powder benefits these cases unless the cause is syphilis.

Remember that many of these cases are complicated by obvious signs of rickets and, therefore, you may be inclined prematurely to order cod-liver oil, eggs, or cream; let me warn you that if you do so before you have corrected the fundamental fault, which is that of *digestion*, you will only make matters much worse, for these infants in the majority of cases, have been wrongly or overfed and therefore cannot digest their diet or improve in health if given excess of fat.

My own experience of these cases is very great, and I know that if you will treat your cases at first for 2 or 3 weeks, as I have suggested, you will find that they will quickly cease to cause you or their mothers anxiety.

In large cities insurmountable difficulties are often raised to the subject of using natural skimmed milk, if so I recommend the temporary use of Horlick's Malted Milk or a very diluted Ideal Milk, or one of the proprietary patent skimmed milk foods. These are all approximately fat-free and should, therefore, be used for a period of at least three weeks, but no longer, for long before that period has elapsed you will have been able to procure a goat.

Acute Dyspepsia or *Acute Gastro-Intestinal Catarrh* are names for a condition extremely common, and I need not remind you that this condition is to all intents and purposes only an acute form of failure to gain. Its causes are in the main the same, i.e., excess of sugar, excess of fat, or excess of protein. Look at this infant, typical of scores you will see every week in your practice or in your out-patient departments. It is flabby, pale, and big bellied, with a dry furred tongue, slight fever and sore buttocks. The mother will tell you that recently the appetite has been poor, the nights restless and fretful with teeth grinding; there has been vomiting, and the stools you will see are green, acid, sour and frothy. I will test the urine and you will see that there are marked acetone and indican reactions. The mother will tell you that he has been wasting despite change of diet from one patent food to another, and so-called tonics ordered by the doctor. You will see from the attached slip from the doctor that he suspects tuberculosis because there is slight retraction of the head, due, no doubt, to reflex irritation from its middle ear.

This condition of acute dyspepsia, or, as I prefer to call it, acute gastro-intestinal catarrh is very common, but what I want to impress on you is that this condition is, so to speak, a cloud-burst occurring in all children who have been wrongly fed without judgment, or consideration as to the normal capacity of the child's assimilative powers. The symptoms are really those of mutiny after long misuse, and if you do not spot this by your urgent and concise enquiry you are apt to think you are dealing with a case of acute dysentery, and so, though you may perhaps slowly drag the child through the attack, you may fail to obviate a recurrence of the symptoms in a few weeks' time. I can assure you it is not acute dysentery in the accepted sense of the term, but merely a form of fermentative diarrhœa which will get well in a few days if correctly diagnosed and treated. Here perhaps you will let me digress for a moment to remind you that amœbic dysentery is very rare in young children. In my own experience it certainly does not occur in more than 5 per cent.; however, I would ask you to bear with me when I say never give emetine until amœbæ have been demonstrated by a reliable observer, and if in doubt *never* give it, for often I have seen lives endangered and lost on the false assumption of amœbic dysentery. Bacillary dysentery, on the other hand, is far more common, its principles of treatment, as you know, are those of bacillary dysentery in adults.

How will you treat this case of acute gastro-intestinal catarrh?

In the first place, let me advise you to starve the baby for the first few hours and to give only plain water, weak tea, or rice water, with or without saccharine ½ gr. to a pint for the first 12 hours. In the second place let me warn you against permitting any sugar for at least three days. Thirdly, I would ask you to remember that you are dealing with a condition of acute acidosis, and, therefore, you must supply an alkaline fluid.

I think the very best method is to give directions that the child shall drink 1 to 2 pints per day between feeds of a solution made by adding half a teaspoonful of common salt to a pint of water. This acts in two ways:—(1) It rehabilitates the normal plasma of the blood, for it is very quickly absorbed.

(2) It makes the child automatically thirsty and therefore one succeeds in getting it to take more fluid by mouth. After 12 to 24

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hours on the above innocuous fluids the child should be given skimmed milk according to the method indicated in *failure to gain*. On the third day dextri-maltose in the shape of Mellin's can be added as before. As progress shows itself, the diet may be very gradually increased in the shape of rusk biscuits, dry toast, Grape Nuts, vegetable soup, etc. In the majority of cases no medicines are needed, but constipation is likely to occur and for this again paraffin and milk of magnesia mixed are the best laxatives and anti-fermentatives.

If the onset of the complaint has been so fulminant that you suspect bacillary dysentery, or at least are not sure, then I would advise you to put the child on a prescription, as follows, every hour until the stools become brown and alkaline. The prescription is:—

Sodium Bicarb.	10 grains.
Sodium Citrate	10 grains.
Sodium Sulphate	15 grains.
Glycerine	20 minims.
Aqua Anisi	1 drachm.

The preliminary saline and rice water treatment being adopted as above; brandy, 5 to 10 drops, may, if you wish, be added to each feed.

On such lines of treatment you will find that the child, after a primary loss of weight, will rapidly pick up; it then becomes your most urgent duty to guard the diet against any recurrence of such symptoms or attacks, remembering that excess of fat, or food, is the commonest cause.

Chronic Gastro-Intestinal Catarrh is the commonest children's complaint in India. You will see it in rich and poor alike, but most frequently of all you will see it in the children at boarding schools; indeed so common is it that I could almost tell you when such schools are closed for vacations, for it is then that these cases are brought in large numbers to out-patient departments or consulting rooms.

The cause of this trouble is entirely dietetic. As a rule the diet includes too much sugar, or starch, or rich food. At times there is a history of bad cooking, or indigestible food and hurried feeding. My own experience leads me to think that if there is one article of food, more than any other, responsible for this condition in European children, it is the plantain.

Look at these two children, one from a Calcutta day school, the other from a hill school. One had whooping cough in July; the other is obviously rickety. One is 7 years old and the other is 4. Listen to the story of porridge, curry, rice, and plantains, day after day, and then observe well the symptoms and signs which make the diagnosis certain. The mothers will tell you that they are easily tired, have fainting attacks (so-called), and grind their teeth; in one the appetite is poor and in the other voracious, there is occasional fever with every now and then a so-called bilious attack accompanied by vomiting and abdominal pain. One child wets his bed at night; in both the stools are slimy and very offensive; the tongue of one is flabby and furred, while in the other it is typically mapped; their teeth are bad, and there are dark lines under their eyes; they have big protruding bellies, and the mothers state they have often a "stomach cough." The younger of them has a typical lichen rash, and, if you will watch me test these two specimens of urine, you will see that both give marked acetone and indican reactions.

These two children are typical of hundreds all over India of all creeds and stations; they cause great anxiety to their mothers, and many of these cases have been diagnosed as tuberculosis, or even appendicitis; and yet I can tell you that there is nothing more remarkable than to watch their improvement if a correct diagnosis is made, and I might even say there is nothing more convincing in practice than to demonstrate the urinary fault; but let me warn you at once that improvement will not be obtained by giving cod-liver oil, or Parrish's Chemical Food, or other emulsions, indeed I find that the majority of cases have had these so-called remedies, and most of them have had treatment for worms, but have not improved.

If you will recognise the condition, a cure is certain; if you do not, chronic ill health, and possibly the supervention of some more serious disease may carry the child off. It is this disease in India which, remaining undiagnosed, follows measles and whooping cough and lays the trail for tuberculosis. How many times have you not heard a mother say that her child's health was splendid until he had measles or whooping cough, but the child has never picked up since?

I feel that if only practitioners would make it a habit to test the urine for acetone and indican, much child suffering would be saved, and here I would like to say that if a child has contracted measles or whooping cough in the hills and fails rapidly to recuperate, it would be far better to send him to a seaside resort, for undoubtedly the hills do not suit these cases when their gastro-intestinal tract is out of order.

Your rules for treatment should be as follows:—

1. Attend to the teeth and moderately starve for three days first.
2. Make the child chew and not bolt its food.
3. Exclude the presence of worms; also of enlarged tonsils and of adenoids.

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4. Water ad lib. but no food or sweets between meals.

5. Nothing to eat after 6-30 p.m. except a cup of milk and a rusk.

6. If under 4 years of age, wake from sleep half an hour before meals and allow to run about.

7. Postpone drinking till after meals, or one hour before meals.

8. Do not give too much milk in addition to a substantial dietary.

9. Do not give cod-liver oil. But you can give malt alone, one to two drachms, after meals, or malt and pepsin.

10. Do not give iron, or any iron tonic such as Parrish's food, etc., until the child has been on a "stomach alkaline mixture," etc., for two to three weeks, with a powder such as:—Hyd. cum Cret. gr. 1, Pulv. Rhei. grs. 2, Sod. Bicarb. grs. 3, Sacch. Lac. grs. 4, each night; and *until the tongue is clean.*

11. Prevent constipation. But never give raw fruit for constipation.

12. Hard mattress. Light bed clothes and lots of sun and air.

Diet.

May not be taken.	May be taken.
Ordinary bread, buttered toast, biscuits, brown bread, whole-meal bread, farinaceous puddings, (sago, rice, tapioca, arrowroot, etc.), porridge, pastry, sweets, chocolates, cheese, potato, much butter, any jam, thick soups, fried or salted, or fatty meats, vegetables (except as opposite), raw fruit, fruit cake, plain milk, tea and coffee, bananas (plantains), scones, smoked fish.	Bread baked hard, dry hard toast, rusks, Veda bread, Grape Nuts, lemon sponge, Force, malted infant foods, e.g., Horlick's; calf's foot jelly, Madeira cake, a little butter, little honey or treacle, clear soup, beef tea, chicken tea, underdone meat, fish, chicken, sweetbread, mutton, eggs, boiled, brains, minced bacon fat, spinach, flower of cauliflower, Brussels' sprouts (mashed), vegetable marrow, very little mashed potato, fruit juice, diluted milk, whey, malted milk, skimmed milk, Bulgarian milk, cocoatina, Ovaltine.

Constipation is frequently a source of trouble, for this senna pods, or paraffin and milk of magnesia, or "Cascara Evacuant" are useful. These children are often anæmic; and I warn you that no iron or tonic emulsion should be given for the first 2 or 3 weeks, and not until the tongue is perfectly clean, after this period any mild iron preparation is useful. As the health improves, the diet can gradually become more liberal, but if there is a return of any of the symptoms, the forbidden article of food should be stopped at once. As a rule it takes from 4 to 6 weeks before the child regains health.

This disease is often called *mucous disease,* and often you will find that mothers bring their children with the sole complaint that they are passing mucus in the stools, but no worms have been passed or seen after or before worm treatment; therefore if you do not thoroughly examine the child—and by this I include a proper urinary examination—you may miss the diagnosis and treat the case for weeks as dysentery, or chronic colitis.

Acute gastro-enteritis.—This infantile disease is perhaps the greatest nightmare of all to mothers in India. The onset of the hot weather is the commonest time, and very frequently it is due to the non-recognised fact that in the hot weather the child does not want so many calories of food as it does in the cold; for instance, a child may be having a perfectly correct food in March or April, which is too much for him in May or June, the result is that the digestion is very severely taxed, and vomiting and diarrhœa occur. Now if this condition occurs in a child of 4 or 5 years it is labelled as a bilious attack, and frequently the child rapidly reacts to treatment or home remedies, for, as I have already told you, a bilious attack is after all only an acute acidosis occurring in children with chronic dyspepsia; but if this diarrhœa and vomiting occur in an infant, the danger is very quickly appreciated by the mother, for, whether you call the disease summer diarrhœa or gastro-enteritis, it makes no difference, the prognosis is serious and treatment very imperative, as not only is acidosis present but there is also the factor of immense *dehydration* to be dealt with.

What I want you most to bear in mind, is, that in these cases there is no specific micro-organism which you can isolate as the cause. In some cases it is a putrefactive bacillus, and, if you will bear this in mind, you can very often obtain confirmative evidence by looking at the buttocks and testing the stools. In the putrefactive infection the buttocks are not sore or red, the stools are alkaline and offensive in the early stages; whereas in the gas-forming bacillus infection the buttocks are scalded and red, and the stools are sour and acid.

1. *Treatment.*—Whatever the cause, whether injudicious feeding or infection; whatever the severity of the attack, the preliminary treatment is—

(1) to get rid of the poison and allow the inflamed intestine an opportunity of recovery;

(2) to counteract the acidosis;

(3) to supply the loss of fluid from bowel and stomach;

(4) as soon as possible give that fluid diet which will least provide a pabulum for the organisms which have caused the trouble, that is the putrefactive or fermentative type of bacillus.

As regards No. 1, put the child at once on half or one hourly doses of Sodium Sulphate grs. 20; Sodium Bicarb. grs. 10; Sodium

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Citrate grs. 10; Glycerine 20 minims, Aqua Anisi 1 drachm, until the stools become watery and brown; if there is vomiting wash out the stomach with 1 per cent. sodium bicarbonate solution, using a catheter and funnel; the same solution can be used to wash out the rectum. If the vomiting is severe 1/10 or 1/6 gr. of calomel (B. & W. tabloid) every hour for 6 or 8 doses.

2. *Acidosis* can be proved if you care to examine the urine, but more striking is the air hunger, the quick gasping respiration, the anxious expression, and the cherry-red lips in a white-grey face.

The above prescription will assist you, but more useful is it to remember that this prescription will make the infant thirsty, and that if you will add half a teaspoonful of salt, and half a teaspoonful of soda bicarb. to a pint of boiled water,—adding if need be half a grain of saccharine to make it palatable, the child will readily take this in large quantities, and by so doing supply the loss of fluid and become thirsty for more fluid.

3. *Dehydration.*—The shrunken muscles, loose skin, and sunken eyes, cry out that the tissues have been drained of fluid; this loss you must supply, or the infant will die. Undoubtedly the best way is to give the above saline by the mouth for the reasons I have given, and I can assure you that it is extraordinary to see the quantity of ½ per cent. saline that these children will absorb. The bottle should be kept filled and beside the infant and it should be offered at all times. If you see the case late and it is obviously very urgent, then I would advise you to inject 4 ozs. of saline, every 4 or 6 hours, into the axillæ or loins, using an ordinary serum syringe. This method is not painful and can be done very quickly, and the saline is very readily absorbed. In hospital or nursing home practice, personally in all cases of emergency, I prefer to use the intra-peritoneal method—by this I mean the method of injecting saline directly into the cœlomic cavity. Choose a point in the middle line two inches below the umbilicus, and, using a large record needle attached to a funnel and tube, run in 12 to 18 ozs. of hypertonic saline; with ordinary care there is practically no risk in this.

What I want you to understand is that these children do not die directly from the effects of the poison they are manufacturing and absorbing from the bowel, but from the mechanical results of dehydration, therefore, if you can make good, and continue to make good the fluids lost, then you will only have the intestinal condition to deal with.

4. *Feeding.*—To begin with nothing is to be given except rice water, or weak tea. Rice water is less irritating than any other cereal, and is made by adding one tablespoonful of rice to 1½ pints of water, boil, strain, and add a pinch of salt. If the child is peevish, an excellent home remedy is to give raisin tea. This is a harmless glucoside and is made by adding one tablespoonful of raisins to one pint of boiling water, crushing and straining.

After 24 hours you may give protein-milk, whey, or skimmed milk, alternately with the rice water.

Remember you must increase the strength of the feeds very slowly. Under no conditions should sugar, or any fat-containing food, be given for several days, but if you consider the child is not having sufficient carbohydrates, you may give a small quantity of Mellin's, or some other malted food, such as Horlick's.

5. *Treatment of symptoms.*—*Abdominal pain* is best treated with hot compresses or Antiphlogistine.

Coldness or collapse.—Hot mustard bath, brandy per mouth, and saline per rectum or under the skin, or 5 per cent. glucose solution per rectum; injections of camphor or pituitrin are sometimes of use.

Rectal Tenesmus.—Use hot fomentations applied to the anus; washing out the lower bowel with saline or an enema of starch.

Remember never give any form of bismuth, chalk or opium, while there is fever.

Acute Œdema sometimes arises as a result of the saline per mouth, or rectum, or under the skin; sodium citrate may cause the same thing. If the cause is recognised, all that is necessary is to stop these temporarily.

Vomiting.—For uncontrollable vomiting one minim doses of chlorodyne are useful. Remember that these children frequently suffer from lung complications and may die in convulsions.

A remote complication of gastro-enteritis is chronic gastro-intestinal catarrh, which must be treated on the lines I have indicated previously.

Anæmia is frequently a marked feature of these cases, and in the later stages must be treated by dietetic rather than by medicinal means; by this I mean that when the child is well, green vegetables, milk and eggs, are undoubtedly the best foods, but it should be remembered that for many weeks these children are unable to digest food, and particularly fat well, therefore it is best to give skimmed, or malted milk until the stool reaction is good and the tongue is clean.

Skin affections, such as boils which come out for weeks in crops, are frequently seen. Correcting the diet, and a change of climate, are better than vaccines. Constipation is often troublesome; for this paraffin and milk of magnesia mixed or senna tea are useful.

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A Mirror of Hospital Practice.

A CASE OF ABDOMINAL INJURY TREATED BY RESECTION AND ENTERORRHAPHY.

By S. C. DAS GUPTA, L.M.S.,

Senior Medical Officer, Bir Hospital, Katmandu, Nepal.

ON the 30th September 1923, at mid-day, Branmacna, a Hindu male, aged 50, was admitted to hospital with an abdominal injury.

History of present condition.—He was in a drunken condition when attacked by a wild buffalo, the horn of the animal penetrating deep into the abdomen through the upper part of the scrotum, beneath Poupart's ligament, and by the side of the inguinal canal. Immediately after the injury the man walked a few paces and ascended a bamboo ladder near by to save his life. Some neighbours rushed to his assistance, and finding blood on his clothes, brought him to hospital within half an hour of his sustaining the injury.

On removing the patient's dirty clothes, a coil of intestine was seen to be protruding from the wound, and examination shewed that the loop of intestine which was protruding was torn across in two places into three pieces. Later a large roundworm was found on the stretcher on which he had been carried.

Operation.—In the absence of the assistant surgeon I had to depend solely on the help of the hospital dresser and compounder for this operation. The instruments, etc., having been sterilised and the protruding coils of gut washed well with warm saline, four Doyen's clamps were applied to the gut, two on each side of the injured portion. Some three-quarters of an inch of the injured gut between was then removed with a blunt-pointed bistoury, together with a triangular piece of mesentery, with its base at the injured part of the gut.

A circular enterorrhaphy was next carried out, joining the severed portions of gut by an end to end anastomosis. Interrupted fine catgut sutures were used in order to avoid narrowing the lumen of the gut, and a final continuous Lembert suture all round through both peritoneum and muscular coats. Finally the margins of the mesentery were brought into apposition by a continuous silk suture. The coil of intestine was now well washed with warm saline and reduced into the abdominal cavity without difficulty.

The perforation through which the gut had prolapsed was next narrowed by deep sutures with thick catgut, the injured scrotum washed with perchloride solution and painted with tincture of iodine, and the superficial wound closed with silkworm gut ligatures, leaving a small opening for drainage.

During operation one c.c. of pituitrin was given hypodermically, and at its close a half grain suppository of morphia given per rectum. The patient was put to bed covered with hot blankets, and hot water bottles placed at his sides and between the legs. The foot of the bed was raised six inches.

After-treatment.—Early next morning ten c.c. of antistreptococcal serum (polyvalent) was injected; and nothing allowed by the mouth for the first 24 hours except sips of warm water when thirsty. The patient was kept continuously on his back for three days. Rectal salines were started eight hours after operation, 4 ozs. every 4 hours.

The patient complained of slight pain almost every evening and sleep was disturbed, so a quarter of a grain of morphia sulphate and 1|200th of a grain of atropine sulphate were ordered each night if there was insomnia.

On the 11th day gruel and clear soup were permitted and on the 21st day soft rice gruel, broth and dal soup.

There was no further abdominal complaint but the scrotum became gangrenous in places and sloughed. Hot perchloride of mercury compresses were continuously applied and hydrogen peroxide used at each change of dressings. Later a cough mixture for a slight cough, and still later an iron tonic and syrup of hæmoglobin were given, as the patient looked decidedly anæmic about the third week.

The temperature after operation never rose above 100°F., and the patient was allowed to sit up in the reclining posture after two weeks, and after four weeks to walk on the verandah. On the 31st day after operation solid rice was allowed, and he left the hospital in sound health on the 37th day after the injury.

ASCARIS LUMBRICOIDES AND SEVERE HÆMORRHAGE AS COMPLICATIONS IN A CASE OF MIXED TYPE OF DYSENTERY.

By P. B. KARKAREY, M.B.,

Nagpur, C. P.

A HINDU male, aged 49 years, a goldsmith by occupation, had a severe attack of dysentery of mixed type (bacillary and amœbic). On castor-oil emulsion the stools were fairly healthy on the second day, whereupon the patient discontinued taking the mixture. On the third day he commenced to pass streams of blood per rectum, and the relatives having become alarmed, I was called in.

When first seen, the patient was in a sinking condition and 1 c.c. of Hæmoplastin (P. D. and Co.) was given hypodermically, followed

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soon after by half a grain of emetine hydrochloride. The bleeding now ceased, but the pulse continued to be thready. One c.c. of camphor in oil was accordingly administered, and the patient's condition improved, the pulse tension becoming better.

Castor-oil, bismuth and opium mixture was next given, with a light diet of barley water and sherbet, and a hot flannel binder applied to the abdomen. The dysentery, however, continued with streaks of blood in the stools. A change was therefore made to salol with sodium bicarbonate.

Two days after commencing the powders, I was informed that the patient had vomited a roundworm, 12 inches in length. At night, accordingly, a powder of 3 grains of santonin with 20 grains of sodium bicarbonate was given. A bundle of ten roundworms was passed, and on continuing this line of treatment, 32 worms were passed in all.

Simple astringent mixtures and bismuth powders were next administered, with a restricted diet, and the patient made a speedy recovery. Two months after the onset of his illness he was back at work.

The recovery after so severe an attack and with a heavy *Ascaris* infection in an elderly man was very satisfactory. No relapse occurred.

A CASE OF A PERFORATING INJURY OF THE EYE FROM A FOREIGN BODY, AT THE CLINIC OF WIEDENKRANKENHAUS, VIENNA.

By A. D. SHROFF, M.B., B.S.,

Royal London Ophthalmic Hospital, City Road, London, E.C.

WHILST recently attending this clinic on my way to London, I saw a very interesting case of injury to the eye by a foreign body. The details were as follows:—

The patient, Melzer Franz, aged 27 years, is a blacksmith by occupation, and a week before admission to the clinic, whilst he was hammering on the anvil, a particle of iron sprang from the anvil and hit his eye. Whether it had entered into the globe or not he could not say.

On examination vision was 6|12ths. Under the conjunctiva, just near the limbus about the 9 o'clock position, a dark point was visible. At 10 o'clock position at the inner border of the ciliary portion of the iris, a square hole was present, the size of a small pin's head. On dilation of the pupil with atropine a fine white streak of opacity was seen, beginning just behind the hole in the iris and leading outwards and backwards to a bigger circumscribed opacity, the size of a large pin's head.

On ophthalmoscopic examination, a brightly glittering foreign body was visible in the retina in the lower part of the fundus. Its surface could be seen with a +8, and the surrounding fundus with a +3 lens. The fundus around the foreign body shewed yellow patches with pigment spots. The rest of the fundus was normal.

On attempting to extract the foreign body with the big electro-magnet, the patient did not complain of pain. The foreign body did not move at all, and for two days unsuccessful attempts were made at its removal.

On making a similar attempt on the third day, however, the ophthalmoscopic picture was substantially altered. At the former site of the foreign body there was now only a fine hazy spot of exudate, the foreign body was now further forward in the eye, and could be seen to move in response to the magnet to nasal and temporal sides in turn.

Two further days were spent in attempts at extraction by the electro-magnet, but without success. Finally, an incision was made a little below the limbus, through the conjunctiva and sclera, and the point of the magnet introduced into the eye. The foreign body immediately sprang to the magnet, and was withdrawn without loss of vitreous.

It proved to be a flat particle of iron, 1 mm. long and some ½ mm. broad, and weighed half a decigramme. At 10 cm. distance from the magnet it moved only very slightly; at 8 cm. distance it followed the movements of the magnet; from 2 cms. it sprang to the magnet.

The patient was discharged on the 14th day after admission. The wound had healed completely. The condition of the retina at the spot where the foreign body was embedded was unaltered; the rest of the fundus and vitreous were normal. Vision was 6|12ths, and with a +1 lens, 6|9ths.

There are several features of interest in the case. The absence of all painful reaction is one. Secondly, one should not conclude that a foreign body half embedded in the retina is *not* iron because it refuses to move towards an electro-magnet. The exact position of the foreign body should be located by examination with the ophthalmoscope or by scleral lamp examination. If this is impossible, on account of opacity of the lens or through hæmorrhage or swelling, an X-ray photograph should be taken. Such a case had occurred in the clinic, where, owing to hæmorrhage in the vitreous, the foreign body could not be located, but was shewn by X-rays, and was extracted after two or three days, when the hæmorrhage had subsided. Vision in this instance, after removal of the foreign body, despite the hæmorrhage and swelling, was 6|6ths a few days later.

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Indian Medical Gazette.

MARCH.

OBSTETRIC TEACHING.
THE LIVE METHOD.

THE General Medical Council recently requested that India should put its house in order with regard to the subject of obstetric teaching, because it was considered unfair that a graduate of an Indian University should *ipso facto* be put upon the English Register when it was known that his teaching and experience of midwifery was not in any way equivalent to that of students of the British Isles.

The ukase of the General Medical Council created considerable heart burning in India, for in many Universities, owing to the caste prejudices of the people, it was utterly impossible to provide students with the necessary number of cases to be signed up for, and moreover it was felt that whereas the general practitioner in the United Kingdom had to rely for a good deal of his bread and butter on a definite standard of knowledge of obstetrics, his brother practitioner in India was only very rarely called upon to exercise any knowledge of this subject.

We may have a certain amount of sympathy with the Indian view, but still, if a graduate of India desires the privilege of being placed upon the English Register, it is obvious that the General Medical Council have a right to make their own conditions; for it must be remembered that this privilege allows an Indian practitioner to put up his plate and practice cheek by jowl with, or in opposition to, British graduates in the United Kingdom.

The conditions of India are so entirely different to those of England that it is extremely difficult to arrive at a solution of the problem which faces practically every University—the problem, that is, of providing the requisite number of cases per student, namely 20, as is required by the General Medical Council. Some Universities are frankly disheartened and are inclined to accept the inevitable result, non-registration; others are moving the municipalities to assist them in forming extern departments which are under the supervision of municipal midwives; others again are evading the exact letter of the law by counting each case in which three students or graduates assist, as one case to each of the three students.

Circumstances being such, and the privilege of being admitted to the Register of the General Medical Council being realised, the question arises as to whether we cannot evolve a system of obstetric teaching which will meet with the approval of the General Medical Council and yet will enable us to turn out graduates who are as good as, or better than, their brothers in the West.

No thinking man is proud of the statistics of the Registrar General of the United Kingdom, for it is a fact that to-day the maternal morbidity and mortality is hardly one iota better than it was twenty-five years ago. This being so, is it not possible that the boot is on the other foot and that our time-honoured system of Western teaching is wrong?

The art of obstetrics should not be the art of muddling through which it is, or has been. In my opinion it is far better for the graduate or student to conduct six cases properly in an institution rather than muddle through twenty unaided and haphazard in some tenement house; though by all means he should witness at least fourteen more similarly conducted by nurses or students in a hospital or extern department. In this way we shall create an *ideal* which he would carry in his memory for the rest of his life; but before each student takes up his midwifery duties, I think that it is absolutely necessary for him to attend a course of what, for want of a better name, I call a *live method of teaching*, for a period of at least six weeks in some lying-in ward.

What is this system?

Any institution can have made a female dummy double the size of that ordinarily used; this can be made in exact imitation, by a Chinaman, out of three ply tea-box wood. The vulval outlet is made rhomboidal, soft, and roughly 5 inches across, and the antero-posterior diameter of similar measurements; the vertebral column, sacral promontory, sacral bays, and pelvic cavity should be exactly copied.

In this dummy, upon a thick warm Turkish towel, is placed any recently nursed infant up to ten days old; then one by one each vertex presentation is taken up and its diagnosis, management, complications and treatment should be gone over; similarly with the baby as breach or transverse. Then placing it in a conical canvas bag cut off at the apex, and using a thin red 'sorbo' sponge with a piece of red tape attached to it and to the vest of the baby at the level of the umbilicus, as a placenta, the principles, pathology, symptoms, diagnosis and treatment of accidental hæmorrhage and placenta prævia are demonstrated; and if two 4½ inch diaphragms are made—one representing the fascial plane and the other the muscular plane of the pelvic plate—and placed under the head of the baby in the pelvic cavity, and if the cut hole in the apex of the bag representing the uterus is placed through a space in this diaphragm representing the genital hiatus, one can demonstrate the method of using De Ribes' bag and Krause's

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method of bougies for induction. At the same time students can be taught the anatomy of the pelvic diaphragm and the results of its laceration—cystocele, prolapse or rectocele. Finally the most important point of obstetrics, namely, the proper understanding of Munro Kerr's manœuvre, can be demonstrated by the simple means of placing a large roller bandage under the Turkish towel between the sacral promontory and the baby's head. Indeed I do not know anything in the realm of teaching more convincing than a live baby overlapping the brim of such a dummy. The principles of a test labour, induction or Cæsarean section can then be demonstrated and the whole subject of contracted pelvis, or a big child, mature or post-mature, can be made perfectly manifest, for each student can in turn do the manœuvre.

It is hardly necessary to dwell upon the immense importance of indelibly carving on the memory of Indian students this manœuvre, for a great proportion of the cases to which practitioners in this country are called are "late cases" in which the head of the baby is floating above the brim.

So on and so forth, the whole gamut of obstetrics can be gone over, and if this subject be taught in this way before the student goes up for his examination and is permitted to conduct his six cases, or goes into practice, it will be found peculiarly gratifying to observe the intelligent accuracy with which what I might call the 5 cardinal points of obstetrics are grasped, i.e.:—

1. The relation of the fœtal head to the pelvic brim.
2. Whether the maximum circumference of the head is fixed in the brim or no.
3. Whether the head is flexed or no.
4. Where the back and limbs are.
5. What is the transverse diameter of the outlet. This is a very common type of pelvic deformity in the East, and as in the East vaginal examinations are not readily obtained, I have adopted a simple guide which can be carried out by anyone without unnecessary exposure. My teaching rule is, that if by dimpling in the covering sheet you can place three fingers transversely in the subpubic angle between the pubic rami, then all is well or normal between the ischial tuberosities. This clinical finding or manœuvre has never failed me and is of extreme importance for doctors dealing with sensitive patients.

When the student has fully grasped and visualised every normal and abnormal presentation, even including twins, for two small babies can always be found in every lying-in ward, he may then proceed to learn operative midwifery.

The above method of teaching is so great an improvement, and the live interest of students so convincing, that I am emboldened to think that if teaching institutions in India will try it, not only for students but also for nurses and *dhais*, they will revolutionize the obstetric art of the future generation, for a good teacher can take up every day (1) some subject of the antenatal care of mother and fœtus. (2) The subject of the neo-natal baby and its care. (3) The physiology, pathology, and treatment of every condition can be made a clinical lecture day by day.

The whole success of this *live method* of teaching depends upon the flair and enthusiasm of the teacher, and for those who are sceptical I can assure them that the live interest of Indian students in a subject for which few of them have any natural bent is extraordinary, for this method with its baby lying in its warm crib is vital and convincing, and moreover it does away with that boredom so often shown with mechanical contraptions.

There are a few points which the teacher must observe:—

(*a*) The room must be warm and near the lying-in ward.

(*b*) Each class should not be more than 20.

(*c*) A nurse should always be present.

(*d*) The dummy should be large and soft-lined.

(*e*) The baby should be a small and healthy one, and should have been recently nursed; if this is so, it lies perfectly happy in its warm soft crib and in a whole year I have very rarely heard even a whimper, for even when turned it soon settles down to sleep again.

(*f*) The greatest gentleness and supervision are necessary, and where the teacher is known and trusted not the least difficulty will be experienced in obtaining the consent of any mother, British or Indian for what one is trying to do, and what if need be can be explained to the mother, is to save the lives of perhaps countless women and babies by efficiently teaching students, nurses, and post-graduates the art of obstetrics from alpha to omega.

In this country as well as abroad, thousands of mothers lose their lives every year as a result of operative midwifery, therefore it must be our endeavour in future to teach this subject as we do operative surgery.

The method I would advocate presents no difficulty, for every institution from time to time furnishes its morgue with dead or unwanted neo-natal corpses, therefore all we have to do is to obtain a dummy exactly as before only lined with zinc. Into this is placed a recent body, then one by one, student by student, the whole gamut of operations (excepting Cæsarian section) is carried out. Forceps, hook, decapitator, perforator, and cranioclast, are used one by one, each operation being made a clinical lecture and every

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detail, indication, contraindication, and complication dealt with.

Finally if the circumstances of death are doubtful, before perforation and cranioclasm, an autopsy is performed with a view to discovering whether there are any of those intra-cranial injuries which have been so ably depicted by Mr. Eardley Holland.

I feel, that if in all institutions Indian students were taught on these lines, the reproach of the General Medical Council would be no longer valid, provided the students conducted six cases and witnessed at least fourteen.

Moreover what is to my mind of almost equal importance is that if our municipal *dhais*, district visitors, and nurses were trained or taught the first or *live method*, together with the whole principle of ante-natal care, we should have in a few years circulating, snowball fashion, throughout India a very great appreciation of Western methods, and thereby save colossal loss of life and morbidity; for the fog of ignorance and fear which surrounds expectant mothers would then dissipate.

This method I am advocating is cheap, easy, interesting and convincing: for every mechanism can be watched, every manœuvre, such as Pinard's, or version practised; every difficulty or abnormality demonstrated, and so the student cultivates a visual and tactile memory which is invaluable and lasting.

V. B. GREEN-ARMYTAGE.

THE OTHER SIDE OF THE PICTURE.

SOME of our readers may think that our editorial article of last month did scant justice to the achievements of British Rule in India. We emphasised the fact that the loss of human life resulting from war in India had been reduced to a negligible quantity during the past fifty years, but we also stated that disease and poverty still hold far too firm a grip of the country. While we see no reason to retract a single word that was written last month, we are quite prepared to admit that much has been done to improve the condition of India by British rule. Sir William Vincent has recently shown that India in the time of Akbar, far from enjoying a golden age, was rightly described by a Dutch writer as "the home of stark want and the dwelling place of bitter woe." Life and property were insecure, the population consisted of only a hundred millions of people who suffered not only from poverty of the most extreme kind but also from the horrors of constant civil war and repeated invasions. Since that time British rule has eliminated internal warfare, invasion by foreign hordes, *suttee*, *thuggee*, and the ever present danger of oppression and sequestration of private property. The demands of the State on the revenues of the people are much less than they were in the time of Akbar, 56,000 miles of metalled road and three times as many miles of unmetalled road have been added, there are 37,000 miles of railroad, deserts have been converted into valuable cultivated areas by extensive irrigation, great industries have sprung up which bring prosperity to many, the population has trebled and as an indication of the growth of wealth it is pointed out that India has absorbed 250 million pounds worth of gold in twenty years in addition to a much larger amount of silver. There are other services which have been rendered by England and other countries to India which have been due to or associated with the establishment of British rule.

The amount of money that has been spent by philanthropic agencies in India is very large, to take only one example, the Methodist Episcopal Mission of America is spending about 45 lakhs of rupees yearly in India and most of the money is spent on education and medical relief.

It is only fair that this side of the picture should be studied as wrong impressions are conveyed by the reiteration of such phrases as "foreign oppression," "the drain of India's resources," and by references to the departed "golden age" of India.

The frank recognition of the debt that India owes to Britain does not in the least degree weaken the arguments which we used in our last editorial. Britain may rightly insist on what she has done, but at the same time she must recognise that a vast amount remains to be done in the future. The country is still suffering from a terrible drain in health, life, efficiency and resources from preventible disease and remediable ignorance: the time is ripe for a great forward movement in which Britain and Educated India are bound to cooperate if they have the interests of both countries at heart. The methods by which this policy can be carried out must be the subject of a comprehensive enquiry in which the British Government, the newly constituted Government of India and the "non-cooperating" intelligentsia of India will combine their forces. There must, of course, be no weakening of justice, order and security which are the foundations on which the prosperity of the country rests. The best means of securing these is the adoption of a great constructive policy in which every one of the complex forces of India can combine. The country has already shown signs of dissatisfaction with the panaceas which have been advocated as remedies for its discontent. It is certain that a well-thought-out programme for the advancement of the health and prosperity of the country as a whole will be the best corrective for the racial and sectional antagonisms which threaten to destroy the solid progress which

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has already been achieved. The special interests of British officials, of educated Hindus or Mahomedans, of Brahmins or Non-Brahmins, of commercial or agricultural workers, matter but little; what is of essential importance is that the condition of the whole mass of the population of India should be improved. Non-co-operation thrives and will continue to thrive because the people are vaguely conscious that they are in a condition of economic depression and of ill health, they must be shewn that active measures are being prepared for the cure of their ills. When these are instituted the intellectual and moral forces of India can be expected to turn aside from the suicidal struggle for the advantage of one section of the community at the expense of the other, they will become concentrated on the promotion of the well being of the whole community.

Is it impossible to unite the forces of India under one standard for the carrying out of an intensive campaign against disease and poverty? We are sanguine enough to think that it is quite possible to do so, at any rate it is possible to try. Should an honest effort fail, it will be time enough to be pessimistic as to the future of India.

Current Topics.

"Tubercle."

TUBERCULOSIS is so terrible and so important a problem in medical practice in India, that many practitioners in this country will be interested in *Tubercle*, a monthly journal dealing with all aspects of tuberculosis, and published by John Bale, Sons and Danielsson, Ltd., 83-91, Great Tichfield Street, London, W. 1. The new volume commenced with the October 1923 number; and the journal is published monthly at a subscription rate of 2*s.* 6*d.* per number, or 25*s.* per annum.

The October 1923 number is a special one devoted to the surgery of the lungs and pleuræ. It includes articles by Dr. H. Morriston Davies, M.D., M.Ch. (Cantab.), F.R.C.S. (Eng.), on "The Progress of Surgery of the Lungs and Cavity"; by L. W. Shelley, M.C., B.C. (Cantab.), on "Anæsthesia in Thoracic Surgery"; and special articles by Dr. P. K. Brown, Dr. L. Elsesser, Prof. P. Bull, Prof. H. J. Jacobaeus, and Dr. E. Kay. Prof. L. Brauer deals with thoracoplasty, and the editorial with the future of thoracic surgery. A bibliography of the articles on thoracic surgery from 1920 to date is included, together with a separate section on empyema.

Enquiry on Malaria, Blackwater Fever and Ankylostomiasis in Singhbhum. Report No. 1.

By S. R. CHRISTOPHERS, C.I.E., O.B.E.,
LIEUT.-COL., I.M.S.

From:—The Supdt., Govt. Printing, Patna, Bihar and Orissa.

MOST malarial surveys are of interest, but one by Colonel Christophers is of especial interest. Singhbhum is a mining and iron field of about 3,000 square miles, of considerable importance on account of its enormous mineral wealth, and is the headquarters of the Bengal Iron Company's Mines. The country investigated consists of forest-clad hills, running up to an elevation of 3,000 feet, intersected by rivers with accompanying ravines and alluvial tracts. The labour employed by the Company is mainly permanent and is housed in lines, and consists of some 1,250 coolies arranged in the three settlements at Manharpur, Duia and Chiria. It is also of a fairly settled character. In addition there are employees of the driver and fitter class, largely Mahomedan; Bengali clerks and overseers; and the European staff and their families who are housed in seven bungalows.

A preliminary survey of 228 persons employed gave an average hæmoglobin percentage of 72 per cent., the percentage for individuals with enlarged spleens working out some 10 per cent. lower. Two individuals who shewed respectively 30 per cent. and 20 per cent. hæmoglobin readings shewed also respectively 700 and 4,000 ankylostome ova per gramme of fæces. The spleen rates in the different sets of lines varied from 17 per cent. to 77 per cent., and children of ages 3 to 5 years shewed the largest incidence of enlarged spleens. Of 208 children examined, no less than 178 were found infected with malarial parasites, an endemic index of 85 per cent., and at Manharpur the average number of parasites per c.mm. of blood was no less than 6,492.

In brief what Colonel Christophers finds is that from the ages of one to two years most, if not all, Indian children in the areas concerned pass through a stage of continuous malaria infestation with symptoms of malaria, —acute febrile infestation. In children aged 2 to 5 years the proportion infected is still as high as ever, but the average number of parasites found per c.mm. is lower, and there is less fever. From the age of 6 to 10 years the infestation rate is still approximately 100 per cent., but the degree of infection is below the febrile threshold. In fact the conditions here present throw a vivid light upon the conditions present in areas of hyper-endemicity. The youngest children up to 2 years of age get malaria as an almost continuous infection; those from 3 to 5 years of age are just as heavily infected but suffer less from fever; those from 6 to 10 years of age become afebrile malarial carriers. In the adult, tolerance to parasite infestation has been acquired, and the spleen rates are approximately over 50 per cent. for children and 10 per cent. for adults. Fifty per cent. of adults still shew malaria parasites in their blood films.

Given European immigrants and their families entering such a hyper-endemic zone, acute and repeated attacks of malaria at once follow. The prevailing anopheline carriers are *A. willmori* and *A. listoni*, the latter being probably the more important. The situation of lines for coolies and of bungalows for European staff have been selected without consideration of the breeding places of these species in the rocky streams and riverine beds; cliffs and bluffs being selected as a rule.

What measures should be undertaken to remedy such a state of affairs, it is difficult to say. Subsoil drainage of stream channels and training of the rivers is the obvious remedy, and this should be employed at least for the streams at Manharpur; but would be very costly elsewhere. In some instances rebuilding of bungalows and lines on new sites would probably prove less expensive. On the other hand the settled adult labour is already so acclimatised to malarial infestation that the rebuilding of lines may perhaps be postponed.

The whole enquiry only lasted for three weeks; but Colonel Christophers' report is one of the most striking which we have seen; especially in its lucid and dramatic representation of the incidence and course of malarial infestation in the children and adults of a settled labour force. The screening of European bungalows is advised as the measure most immediately possible, together with the prophylactic use of quinine.

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Aches and Pains of Renal Origin.

By ANDREW FULLERTON, C.B., C.M.G., F.R.C.S., F.A.C.S.,

Surgeon to the Royal Victoria Hospital, Belfast.

B. M. J., Feb. 24th, 1923, p. 309.

THE records of upwards of 1,500 successive cases of cystoscopy, show that the most extensive disease of the kidney may exist without any pain whatever, and, on the other hand that a very slight departure from the normal may be associated with almost unbearable agony; also that a precisely similar condition may, in one patient, give rise to the merest local discomfort, and in another to pain of a severe character, radiating to the utmost terminations of the peripheral nerves.

The most frequent cause of renal pain and renal colic in its worst form is renal calculus. In 72 consecutive cases pain was present at some time or another in all but two. The pain was of the most varied character. The radiation of the pain in these calculus cases varied greatly. Most usually it radiated towards the groin, testis or labia majora, frequently over the buttock, or down the inner or outer side of the thigh, sometimes into the penis, sometimes down the leg as far as the heel or toes, and occasionally all over the abdomen.

Occasionally renal pain is due to the passage of crystals of calcium oxalate, and probably other insoluble salts in the urine may cause pain. In many of these cases of renal calculus frequency of micturition, especially during the attacks of pain, was complained of. This was apart from any associated cystitis or other bladder affection. Reflex vomiting, pallor, and cold sweats were exceedingly common in the severe attacks.

Renal pain is not a cardinal symptom of tuberculous kidney. In 117 consecutive cases pain was complained of in 56 cases only. Even in advanced cases pain may be entirely absent. In most of the painless cases there was thickening of the ureter, and in many very extensive destruction of the kidney substance. In the painful cases the symptoms resembled those occurring in renal calculus, but were rarely so severe. It was described as an ache, or a soreness more or less constantly present, or a feeling of fullness on the affected side. Attacks of renal colic were, however, not uncommonly met with, but these rarely attained the intensity of those due to calculus. A few patients stated that the pain started in the bladder and radiated up into the kidney of the affected side. Some complained of "soreness" in both kidneys, and in a few the pain was on the side opposite to the seat of disease. Radiation of the pain was somewhat similar to that found in calculus. In one case the pain radiated to the shoulder on the affected side. Vomiting and pallor with sweats were less frequent than in the case of stone.

Pain is a very frequent symptom in pyelitis. Thus out of 75 cases pain was present in 59. In the acute cases with rigors and fever, vomiting, pain and tenderness with perhaps palpable swelling of the affected organ and muscular rigidity were commonly present. The pain was more fixed and constant than in calculus and tubercle, and was not generally so severe as in calculus. Even in the acute cases, however, pain may be entirely absent. In chronic cases pain is often absent and the affected kidney is only discovered by cystoscopy or ureteral catheterization.

In hydronephrosis and pyonephrosis pain is a frequent symptom. Out of 37 cases examined, pain was present in 31, and doubtful in 2. The pain, like that due to calculus and tuberculosis, varied very much in character and distribution. A very frequent history was that of pain and a tumour in the side, associated perhaps with vomiting. It is noteworthy that the radiation of the pain resembled very closely that seen in renal calculus. The pain in certain cases of hydronephrosis and pyonephrosis may rival in severity that found in renal calculus.

Pain may be entirely absent in cases of renal tumour. It was present in 11 out of 18 cases recently examined. It was described as a soreness, a dragging pain, pain and tenderness, or severe renal colic.

In some cases of hæmaturia pain may be absent. In others the well known symptoms of renal colic are present.

Pain is often present in cases of movable kidney, but this condition is so commonly associated with other manifestations of visceroptosis that it is difficult sometimes to apportion the blame between the various organs concerned. On the right side especially it may be impossible to differentiate symptoms of appendicitis, mobile cæcum, and other abdominal affections from those due to displacements of the kidney, and mistakes in diagnosis are often made.

Renal pain may be due to some condition of bladder or urethra. Carcinoma of the bladder, a papilloma at a ureteral orifice, an enlarged prostrate, or stricture of the urethra may cause renal pain on one or both sides from back pressure.

Mr. Fullerton admits that he has only too frequently seen cases of renal colic in which he has been unable to trace the cause. In some of these the urine has been perfectly normal and X-ray examination negative. In a certain number the only indication of a renal origin has been diminished specific gravity on the affected side.

Recent advances in the methods of examination will reduce the number of undiagnosed cases and add to the satisfaction of all concerned in the investigation and treatment of these elusive complaints.

The idea running through this address is that the pain is due in a large proportion of cases to distension of the renal pelvis. Treatment should be directed towards removing the cause, and involves, in some instances ablation of the kidney.

Castellani's Broncho-Spirochætosis.

FEW subjects have raised more discussion than Castellani's original description in 1905-06 of a form of bronchitis simulating phthisis, with both acute and chronic forms, and due to a causal spirochæte, *S. bronchialis*. Since Castellani's original description the infection has been described from almost every country in the world, but several workers have claimed that the spirochæte is an accidental and not causal parasite in the sputum, whilst Vincent and others consider that Castellani's bronchitis is Vincent's infection, affecting not the throat, but the bronchial mucosa.

In the *Journal of Tropical Medicine and Hygiene* for the 2nd of April 1923, Vol. 26, No. 7, p. 103, Dr. Najib Farah, formerly of Beirut, discusses this disease, a very complete and useful bibliography at the end lending special value to his review. So far all attempts at culturing the spirochæte and all animal experiments have had negative results.

In describing the symptomatology the author divides the disease into acute, subacute and chronic varieties. The acute type may simulate influenza, with a sudden onset with chill and fever, the physical examination of the chest reveals few if any signs, and the hæmoptysis may be slight but is more usually severe. The subacute variety may follow on the acute attack but more often sets in insidiously with scanty reddish gelatinous sputum. The chronic variety has a variable and protracted course with attacks of hæmoptysis, the characteristic red current jelly sputum being typical, whilst examination of the chest reveals little or nothing. The author gives two *x*-ray photographs, one shewing some loss of transparency at the root of the lungs after 18 months' duration, the other shewing zones of sclerosis after 8 years' duration.

The chief interest of Dr. Farah's paper, however, is his account of a fatal case of the infection with pneumonic consolidation of both lungs. The patient, a man of 23 previously in perfect health, was taken suddenly ill with chill and high fever, and a few hours later coughed up enormous quantities of blood. The hæmoptysis was so severe that, when seen on the third day of

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illness by the author, the patient had to adopt an absolutely motionless dorsal decubitus, to avoid hæmorrhage and his bedclothes were soaked with blood. The general state was very bad, the left lung shewed hepatization in its upper half, and the temperature was 40.3° C On the 8th day of illness the temperature fell by pseudo-crisis, but a further rise of temperature and a crisis of hæmoptysis ensued and signs of hepatization were now observed over the left base. On the 13th day there was again a pseudo-crisis, the temperature fell, only to be succeeded by a further rise, another attack of hæmoptysis, and consolidation of the upper part of the right lung. On the 17th day there was again a pseudo-critical fall of temperature, followed by excessively severe hæmoptysis and both lungs became consolidated. The hæmorrhage on this occasion was so severe that calcium chloride orally and injections of gelatine and horse serum failed to affect it. The patient died on the 21st day of illness, the temperature chart having shown four distinct pneumonic periods, with—in each interval—a pseudo-crisis associated with hæmoptysis. No post-mortem was allowed. During the whole course of illness all examinations for T. B. or other pathogenic micro-organisms gave negative results, and the only micro-organism found repeatedly and in abundance was Castellani's spirochæte.

From a description of this case Dr. Farah passes to a consideration of pleuritic and asthmatic varieties of the disease, gangrenous and fœtid types, and the possible modes of infection. Usually the disease is not fatal, even in the fœtid types, although gangrene of the lung is a serious form. By way of treatment Castellani first recommended arsenic and tartar emetic. The author has tried neosalvarsan compounds with little benefit. He finds, however, that the drug *par excellence* is lipiodol, which contains 54 per cent. of iodine in poppy oil; and gives one or more courses of 3 to 6 injections, each of 2 c.c., on alternate days or every third day. The injections are given intramuscularly and no symptoms of iodism have been noted. For hæmoptysis calcium chloride is given internally. Local measures to the nose and throat may also be necessary, as the infection may involve them, and a subsequent course of tonics is given during convalescence.

Dr. Farah's pneumonic case is of interest as the symptomatology described, with its repeated attacks of hæmoptysis and the pseudo-crises, must be admitted to differ from that of relapsing pneumonia due to other causes.

A Case of Quinine Idiosyncrasy.

In the *Transactions of the Royal Society of Tropical Medicine and Hygiene* for November-December 1922, Vol. XVI, Nos. 5 and 6, p. 326, Dr. C. Grantham-Hill describes a case of quinine idiosyncrasy of considerable interest. The patient was a Syrian Government official, living in Khartoum, who had never previously had malaria and had never taken quinine. One day when slightly off colour, he took one 5 gr. tablet of quinine sulphate. Within an hour he was taken ill with dyspnœa, vomiting, diarrhœa, and a red rash which covered the body.

On October 10th, 1922, he contracted fever. He informed his medical attendant of the previous occurrences after quinine, but a dose of 5 grs. of euquinine was administered. An hour later the patient had headache, nausea, vomiting, watery diarrhœa and the body was covered with an urticarial rash. The respiration was shallow and rapid and the pulse 130. Admitted next day to hospital the rash was fading, the temperature was 99° F., and although no parasites were detected in films, there was a suspicious increase of large lymphocytes. As it was considered too dangerous to give quinine, 0.9 gm. of novarasenobillon was given by intravenous injection in two doses on consecutive days, and Fowler's solution by the mouth. Fever continued and the spleen increased in size. Three days later a further 0.9 gm. of novarsenobillon was given, but the arsenic treatment completely failed.

Resort was now had to minute doses of quinine, grain ½ orally. This, however, was vomited. Finally the patient was put on to increasing doses of quinine intramuscularly, rising from gr. ½ morning and evening to grs. 6 morning and evening. The fever disappeared, and the patient was finally able to take 5 grains orally twice a day for three weeks without symptoms. One day, however, he omitted the oral dose, and the next day had a slight attack of dyspnœa lasting for half an hour after the morning dose.

The case is of interest as shewing the inefficiency of arsenic, the rapid acquirement of tolerance and its rapid loss.

The Home Treatment of Internal Hæmorrhoids.

Dr. C. H. Shelly of Hertford writes in the *Practitioner* (Septr. 1923, p. 211), on the subject of "The Home Treatment of Internal Hæmorrhoids." He prefaces his article by stating that in almost all cases of internal piles, provided that the patient is otherwise in a fair state of health, the best and most satisfactory treatment is that by ligature and scissors.

But there are certain cases in which the surgeon may have good reasons for advising against operation. There are many more in which the patient is very strongly opposed to operation. In these much may be accomplished by the patient himself towards achieving relief and comfort, by practising a simple routine procedure and by adopting a more hygienic course of life.

The first step is to empty the intestines completely of all hard scybalous matter, and to take effective measures for preventing any approach to constipation thereafter. The injection of oil is followed by large warm soap and water enemata, given with the patient lying on his right side so as to favour lavage of the transverse colon, with or without occasional doses of castor oil.

The enemata, etc., must be continued until the motions have been quite free from discrete scybala for at least three days; they must be resumed should any scybala be again detected. Afterwards, their place may be taken by a compound rhubarb pill with Pil. Hydrarg, gr. i., or, once or twice a week, Hydrarg. subchlor. gr. i. The patient should take little, if any, fluid with his meals, but sip a tumblerful of water or lemonade—hot or cold, as is preferred—not less than an hour and a half before each meal. All kinds of food must be thoroughly masticated to a thin pulp before being swallowed. The bowels should be induced to act at least once, and not more than twice, every day; and matters should be so regulated that the motions are properly formed and of the consistence of fairly firm porridge.

Upon each occasion that the bowels act the anal region is gently cleansed with soft paper or a swab of absorbent cotton wool and the projecting hæmorrhoidal mass firmly dabbed with a swab of absorbent wool soaked with clean water for nineteen times in succession.

The bleeding may now have stopped; at all events, it will have been appreciably lessened. From a tube of lanoline-hazeline ointment, a portion about the size of a large pea should be squeezed on to the tip of the middle finger of the right hand (the finger-nail having been covered with a finger stall) and with this the whole surface of the protruded mass should be gently and thoroughly smeared. Then, with the three middle fingers flattened out close alongside each other, the hæmorrhoidal mass should be steadily and firmly pressed upwards while the sphincter is first completely relaxed and then momentarily contracted; this alternate contraction and relaxation must be continued while the firm upward pressure is steadily maintained throughout. Gradually, the mass will dwindle in bulk, until it passes completely within the grasp of the external sphincter and is returned within the anus. As it slips within the anus it should be followed by the tip of the anointed middle finger which continues to push the piles backwards and upwards as far as possible within the bowel—by which time the finger will have entered the bowel

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about as far as the middle of its second phalanx. All this time the alternate contraction and complete relaxation of the sphincter in quick alternation should be maintained. The tip, sides, and back of the finger are now pressed firmly in all directions against the wall of the bowel—north, south, east, and west,—while the sphincters are maintained in strong contraction for half a minute at least.

The anus should now be again swabbed with cold water, for another nineteen times; while the sphincter is kept in a state of contraction. The anal region should then be dried with soft paper or dry wool, and finally be briskly rubbed with a wad of soft crumpled paper, not too thin; printed paper should never be used. The patient should then lie down at full length on a firm couch or bed, with his head only on the bolster and a couple of firm pillows beneath his buttocks, for twenty minutes. If the bleeding has been at all profuse this opportunity should be seized for gently injecting a small quantity—oz. ii to oz. iii—of cold water into the bowel; this will be retained with beneficial results. A moderate proportion of hazeline may be added if desirable.

When the piles have ceased to bleed for some few days, the lying down and the cold enemata after each defæcation may be gradually abandoned, whilst the anointing of the protruded bowel before it is returned within the anus will not be required on every occasion. After a little while, even if a hard and bulky motion has to be passed, the patient will be agreeably surprised to find that this is not attended or followed by hæmorrhage. In all other details the procedure must be persistently carried out. A great increase of comfort, both local and general, of bodily well-being and efficiency is secured, and if the patient eventually consents to the more radical operation, he will be all the better fitted, generally as well as locally, to undergo it and to benefit thereby.

A call to defæcation should be promptly attended to. The act of defæcation should not be prolonged any longer than is necessary. Whenever the piles "come down," they should be replaced (as previously directed) as soon as possible.

Deep breathing—of *fresh* air—should be regularly practised. The patient should take all the active exercise which he can achieve, without undue fatigue, every day of his life—and in the open air, without any dawdling or loitering; but he must not stand about afterwards.

The patient may take any ordinary food which he can digest, provided that this is taken under conditions favourable to its digestion (the most important of which is thorough and complete mastication of every morsel of food—be that hard or soft), and that at each meal he takes *no more than* his digestion is equal to dealing with. It is most important that the teeth are efficient and kept in good order.

If hæmorrhoids prone to extrusion threaten to become inflamed antiphlogistine spread on a double fold of lint should be applied to the mass, as hot as the patient can bear, covered with a good pad of cotton wool and kept in place by a perineal bandage, the patient being confined to bed with the foot of the bedstead well raised. Relief is prompt, and it will be found that the softened and shrunken mass, can, before long, be easily returned and retained within the sphincter. Should the piles be chafed and tender, making attempts at reduction very painful, they may be anointed with a little of Oppenheimer's Ung. Anæsthet, Renaglandin. Within a few minutes the mass will have become reduced in bulk and relatively insensitive, permitting of its easy manipulation and return within the bowel. But the ointment must be used sparingly and at rare intervals—twice a week for a week or two only at the most—or secondary results may ensue.

The "Acoustique."

A WRITER in the *Medical Press* (July 18, 1923, page 58) who is deaf himself recommends the "Acoustique," manufactured and sold by its inventor, Mr. R. H. Dent, of 95, Wigmore Street, London, W. This instrument is a very portable one of various types and sizes, there being now no fewer than twenty-five distinct varieties to choose from, owing to the recent improvements introduced by the inventor to meet the special needs of each case.

After testing personally and practically for several weeks two or three of these instruments the author of this brief note, who is himself deaf, has come to the conclusion that nothing has given him such complete satisfaction in the way of hearing as the "Acoustique." He has used one as a pocket companion which enabled him to hear and carry on ordinary conversation with ease. He has tried one whose transmitter was placed on a table in a small box about four inches square connected with an almost imperceptible ear-piece with most astounding reasonance, making him feel for the nonce that he was no longer deaf. Finally, he would remark that there is no quackery about these instruments; they are so far the best aids for the deaf known, but to obtain the desired results, sufferers must be fitted personally from the long range of "Acoustique" with the type most suitable for the individual case.

The Treatment of Bone Infections.

IN the *Nebraska State Medical Journal* for February, 1923, Vol. VIII, No. 2, p. 50, Dr. Winnett Orr expresses his dissatisfaction with present-day methods of treating septic infections of bone. He writes:—

"Among the measures that we have been exhorted to employ are debridement with primary or with secondary closure of wounds, the Carrel-Dakin method, zinc solutions, etc. Secondary sterilization by operation and closure has been extensively employed, and all the old and new resources of asepsis and antisepsis in the treatment of chronic infections have been tried. In spite of all these, however, there still remain not only in the military hospitals but in civilian hospitals and in private homes, thousands of patients with chronic discharging infected sinuses which lead from the skin surface through openings large or small down to infected bone. These are accompanied in many instances by serious deformity or disability of the affected part, whether the bones are those of the spine or of the extremities.

The writer of this paper has seen not only in print but in the military and civilian hospitals every phase of this problem. Not only that, he has himself during twenty years of practice tried most of the methods which, with some of the new ones, he thinks should now be discarded in the treatment of these conditions. Most of the methods have definitely been found to be wanting. The patients do not get well.

In spite of this fact these inefficient methods are still being employed by surgeons and physicians, in a vain effort to heal up sinuses that will not heal.

The writer believes that he has arrived at a fairly standard method which may be employed in the treatment of these conditions. He believes that it is possible to lay down a course which can be applied to practically all such cases, and by which uniform, symmetrical and greatly improved results may be obtained.

The fundamental basis of the treatment which I propose is founded upon the principle of rest, and this applies to the wound and the wound surfaces as well as to the larger anatomical parts involved in the injury. First of all then, one must insist that at the time of injury, at the time of primary and secondary treatment, and throughout the entire course of the period of disability, there must be first, restoration of the injured parts to normal relationship; and second, immobilization and protection in correct position until complete healing has occurred. This may be accomplished either by plaster or by suitable splints.

As splints are usually put on, however, this is not accomplished at all. In many hospitals and in the hands of many surgeons, splints are a source of irritation rather than of relief. Complete immobilization in suitably prepared and properly applied splints never causes pain

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or disturbance. The same is true of the application of plaster of Paris.

For the wound therefore, two conditions really must be complied with. First, if the wound is infected it must be drained; this applies of course to every part of the wound, no matter how deep or in how many directions it may extend. Second, while draining, it must be dressed in such a way that it is not daily or twice daily re-infected. This is a condition which is only occasionally satisfied. My criticisms of present day treatment of the conditions I have been discussing are that as a rule the parts are not placed in correct position, they are not adequately drained, and as dressed in the average hospital or dressed by the average surgeon, the infection is added to rather than reduced by the daily dressings that are done.

For the past two years especially I have been employing a method in which I have been careful to combine the features that I deem of the greatest importance to contribute to the recovery of such a patient. In operating for osteomyelitis of any kind or degree, the attempt is made to remove all infected tissue. This is usually done by 'saucerizing' both soft tissue and bone as suggested by Carrell, Chutro, and others. The wound is cleaned up as thoroughly as possible, and the saucer-like opening of both soft tissues and bone is gently packed with sterile vaseline and gauze. The whole area is then covered with dry sterile gauze and the entire limb or part encased in a well fitting cast of sufficient extent to completely immobilize the infected part. Casts are not split and no windows are cut. If there is no indication on account of a rise of temperature for a change in dressing, this dressing is left in place for ten days to two or three weeks. Occasionally on account of temperature or odour the dressings must be changed earlier. When the dressing is changed it is done by the surgeon or his first assistant. One of the principal points in the treatment is infrequent dressings. That is, rest to the wound.

At the time of changing dressings, it must be done with the same precautions as at the time of the original operation. The wound is cleansed, dried, painted with iodine, a sterile vaseline pack put on, and the whole bandaged into place without in any way seriously disturbing the part or the wound. It should be left at each dressing in much the same condition as at the time of the original operation and first dressing.

By this plan drainage is as free as may be required. As a rule the amount of drainage is small. If the wound has not been entirely cleaned up at the time of operation, or if one gets a mixed infection, there may of course, be complications as in any surgical wound.

One finds in doing these operations as in the secondary closures of soft part wounds that the patient often shows considerable ability to take care of organisms to which he has become accustomed (immunized).

Enough patients have now been treated by us by this method (25 to 30), so that one may say that it is possible to treat such conditions in this way with much better results than formerly and without danger. There have been no serious complications in any case. Several such conditions, even those that have been open for a long time, are soundly healed. On one or two occasions osteomyelitis even in subacute or the early chronic stage has been healed up by such an operation and a few dressings at intervals of ten days to two weeks. In others five or six dressings at intervals of ten days or a fortnight have been sufficient in cases where daily dressings had been done for many months before.

There are a number of other important advantages, such as shortening the hospital period, the very great relief to the patient on account of the infrequent dressings, and the simplicity of care from the standpoint of the surgeon. Stiff joints, adherent muscles and tendons, and contracture deformities result not from immobilization, but from inflammation, and damage to, and adhesions of, soft parts as well as of joint surfaces. This is true as well of joints which become stiff as a result of irritative motion and extension of the infection as of those in which the entire joint is destroyed by a tuberculous infection. Real immobilization and real splints will protect all the parts in the vicinity of such wounds, and diminish rather than increase the amount of adhesions, stiffness, ankylosis, and disability when healing of the first damaged and infected parts has occurred."

Surgery v. X-rays in Hyperthyroidism.

IN the *Journal of the American Medical Association* for March 24th, 1923, page 20, Dr. E. P. Richardson discusses the relative value of surgery and Röentgen rays in the treatment of hyperthyroidism. His conclusions are:—

1. Subtotal thyroidectomy is a more effective form of treatment of exophthalmic goitre than Röentgen ray treatment.

2. The Röentgen ray has a beneficial effect in certain cases of hyperthyroidism.

3. This effect is not sufficiently constant to be relied on as the sole form of treatment. In selected cases of exophthalmic goitre the use of Röentgen ray treatment under careful control is justifiable for a period of four months, during which the patient receives about five treatments.

Tonsillotomy and Tonsillectomy.

Practitioner, March 1923, page 266.

PROFESSOR E. J. MOURE, of Bordeaux, sums up his remarks on the accidents and dangers attending the operations of tonsillotomy and tonsillectomy in parallel columns.

Tonsillotomy.

Serious hæmorrhage, primary or secondary, is very rare.

Fatal hæmorrhage is quite exceptional.

Infectious symptoms are very seldom observed.

Accidents from general anæsthesia hardly ever occur.

Persistence of local troubles is possible, but it is easy to remedy these.

No apparent scarring.

Tonsillectomy.

Primary and secondary hæmorrhage is serious and somewhat frequent.

Fatal hæmorrhage has been observed too often.

Infectious symptoms are rather common and often serious.

Accidents from general anæsthesia are to be feared (blood in the air-passages; asphyxia.)

Persistence of local troubles is exceptional.

Cicatricial lesions are susceptible of interfering with the function of the soft palate.

Professor Moure concludes by pointing out:—

1. That enlarged tonsils do not constitute a serious affection, for they do not put the life of the patient in any danger, and cannot in any way be looked upon as a malignant tumour. In no case, therefore, can a radical operation be considered to be necessary, that is to say, the total extirpation of all the follicles carrying on the tonsillar functions.
2. The results following the operation, especially in the child, are not superior to those of a simple tonsillotomy properly carried out, and in the course of which is removed all the adenoid tissues already infected or liable to become so.
3. Consequently, the benefits accruing to a patient from a tonsillectomy, which may be serious, are in no way in relation with the complications which may accompany or follow the operation.—(*Rev. de Laryngol. d'Otolog., et de Rhinol*, January, 1923.)

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A Method for the Isolation of White Blood Cells.

By PAUL SZILARD, M.D.

(*The Jour. Lab. Clinical Med.*, July 1923, p. 661.)

THE author has worked out a simple means whereby white blood cells can be isolated from a small volume of blood.

PROCEDURE.

The following are the solutions required.

1. 2.5 per cent. solution of acetic acid.
2. 2 " " " " tartaric acid.
3. 2 " " " " potassium hydroxide.
4. Locke's solution.

Blood taken from the cubital vein by puncture or by syringe is defibrinated by gentle shaking with glass beads. Twenty-five to 30 c.c. will yield a goodly quantity of white blood cells. The blood should if possible be used immediately after defibrination, and under no circumstances should it be allowed to stand longer than from 2 to 3 hours before using.

A mixture of acetic and tartaric acid in the proportion of 4:1 is employed for hæmolysis. Of this mixture only the quantity required for complete hæmolysis should be employed. This minimal amount of acid can be determined by preliminary experiments. In the author's experience, 12 c.c. of acetic and 3 c.c. of tartaric acid are required for 10 c.c. of blood.

The quantity of alkali necessary to neutralise the acid mixture to phenolphthalein should also be determined, and for each 10 c.c. of blood 1 c.c. more than the quantity of alkali required for neutralization will be needed. If any of the stock solutions deteriorates through bacterial infection—and this is frequently the case with the tartaric acid—it must be titrated again.

The acid mixure is poured quickly into the blood with which it is mixed by gentle rotation until complete hæmolysis has taken place, as indicated by the varnish-like appearance of the laked blood. A too prolonged treatment with acid is undesirable, since it causes the white cells to deteriorate. The alkali is now poured rapidly into the tube and well mixed, and the whole transferred to a centrifuge tube. If the mixture is brown in colour or shows turbidity when held against the light, it should be discarded. This happens when an insufficient amount of alkali has been employed.

The centrifugation should not be continued for longer than five minutes, as it is injurious to the white cells. But more important than the period of centrifugation is the rate of speed, which should not exceed 1,000 to 1,500 revolutions per minute, since very rapid centrifugation damages the cells.

After centrifugation the cells will be seen at the bottom of the tube as a white agglutinated mass, while the supernatant fluid is homogeneous, transparent, and bright purplish-red in colour. It should be poured off and the sediment suspended in Locke's solution and washed with it once or twice at a low speed of the centrifuge. Ordinary sodium chloride solution should not be employed for washing, as it is injurious to the leucocytes.

When a portion of the washed cell sediment is spread on a slide and stained with May, Grünwald and Giemsa stains by Pappenheim's method, only an occasional red cell is to be seen. At first sight there would appear to be present a greater number of young leucocytes and monocytes than we find in the microscopic film made from blood taken from the tip of the finger. But that is an erroneous impression, due to the great number of cells massed together. A differential count shows the usual proportion to exist amongst the leucocytes.

When the white corpuscles are suspended in a little serum, or better, in their own plasma, and incubated for from half to one hour in a hanging drop, their ameboid movement is clearly visible—evidence that the cells are alive. Directly after centrifugation, no movement is seen or is seen only rarely.

Observations with the Hæmatocrite Volume-Colour Index.

By G. ROSSDALE, St. Bart's Hospital.

The Quarterly Journal of Medicine, April, 1923, No. 63, p. 245.

THE hæmatocrite is an instrument which is too much neglected in laboratory work in general. In this valuable paper Dr. Rossdale discusses its value in connection with the volume-colour index, which is $= \frac{\text{HB. percentage}}{\text{hæmatocrite percentage}}$ i.e., the capacity of the R. B. C. volume for hæmoglobin. He finds that the hæmatocrite is an accurate instrument where the capillary tubes have a bore of 0.5 mm., where whole blood is used, and where a hæmatocrite head is used with an adjustable screw which prevents blood from escaping from the capillary tubes. The centrifuge used must have a speed of at least 4,500 revolutions a minute, at which speed the R. B. C.s of normal blood are completely sedimented in from 5 to 10 minutes. The addition of citrate or oxalate vitiates the hæmatocrite reading by reducing the corpuscular volume per cent., generally by some 14 per cent. when salts are used, as compared with the readings for whole blood determinations.

Unusually rapid sedimentation of the R. B. C.s was observed in five cases, three of acute bacterial infection and two of nephritis, in all of which death was imminent. A low volume index is a rare phenomenon, and when encountered should raise the suspicion that the R. B. C. count may have been too high, or that some of the R. B. C.s may have escaped from the capillary tube during centrifuging.

A high volume index is found in pernicious anæmia, also fictitiously if there has been insufficient sedimentation of the R. B. C.s. The advantages of the volume-colour index over the usual colour index are especially found in those cases where the R. B. C. count is misleading as to the true volume of the corpuscles. Normally the hæmatocrite reading is 50.0, which is expressed as 100 per cent. in determining the volume-colour index. The volume-colour index was found to lie within normal limits, 0.90 to 1.00 in nearly every diseased state with the exception of chlorosis, cancerous anæmia, the terminal stages of pernicious anæmia, and hæmorrhage during the six weeks subsequent to the loss of blood. In septic anæmia the volume-colour index is normal, thus differentiating it from cancerous anæmia. In normal blood the extreme variation met with did not exceed 8 per cent. in the hæmatocrite readings, but in diabetes 10 to 14.8 per cent variations have been recorded.

Reviews.

A TEXT-BOOK OF THE SURGICAL DYSPEPSIAS.—By A. J. Walton, M.S., M.B., F.R.C.S., Surgeon, London Hospital; late Hunterian Professor, Royal College of Surgeons. London: Edward Arnold & Co., 1923, Pp. 728. Price 42s. net.

THIS book is an expansion of the author's course of lectures on the surgical dyspepsias. It aims at clearing up some of the difficulties in differential diagnosis of a group of diseases, the symptomatology of which is by no means clearly presented in the ordinary text-books. The book is essentially clinical and practical, great stress is laid on case histories throughout and the individual symptoms are minutely analysed, in order to show their value in diagnosis. A good example of the author's method is to be found in the chapter on the examination

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of a case of dyspepsia; cases with prolonged history are divided into those with continuous and those with intermittent symptoms, and the latter again into three groups according to whether there is complete intermittence, attacks with slight discomfort in the intervals, or continuous symptoms with more severe attacks. The relative length of the attacks and of the intervals is similarly made the basis of a division into groups, as is the relationship of pain to food. Each of these groups corresponds to a group of diseases and when the indications thus afforded are considered in conjunction with the physical signs and with the chemical and *x*-ray findings, an accurate diagnosis can nearly always be made. Cases of visceroptosis supply most of the exceptions, the *mimicry* of other diseases, especially cancer, being sometimes extraordinarily close.

Rather more than half the book is devoted to diseases of the stomach. The opening chapters deal with the anatomy of the stomach and with the examination of a case of dyspepsia, after which the diseases of the stomach are taken up *seriatim*. The author inclines to the view that acute gastric ulcer is due to infection and quotes some of Rosenow's remarkable experiments on the specific action of certain strains of organisms. For acute ulcer conservative treatment on medical lines is advocated, operation only being resorted to in the presence of recurrent hæmorrhage. A blood transfusion followed by a gastro-enterostomy with closure of the pylorus is then the operation of choice, no attempt being made to find the bleeding point, teaching which is in accord with the practice of most surgeons. Wedge excision combined with gastro-enterostomy is preferred for ulcers on the lesser curvature, and infolding with pyloric occlusion and gastro-enterostomy for pyloric ulcers. Partial gastrectomy he reserves for cases where there is definite ground for suspecting malignancy. Recent work is, however, tending to show that in many cases malignancy can only be detected by the microscope and, seeing that the mortality of partial gastrectomy in skilled hands is only about 7 per cent., it is not surprising that surgeons are tending more and more to adopt the more severe operation. Balfour's operation of cautery excision has never been popular in England and is not advocated. For partial gastrectomy he has discarded Billroth's second method altogether and adopted the Polya retro-colic method, making the afferent loop as short as possible.

The chapters on the technique of gastric operations are very clear, but one notes with regret that no directions whatever are given on the all-important details of the after-treatment and dieting. In the Mayo clinic so great is the importance attached to this, that the physicians resume control of the case after the wound has healed.

The discussion of the end-results of gastro-enterostomy is very interesting, as the author has arrived at the conclusion that success or failure depends on the presence or absence of pyloric spasm or stenosis. Hence the failure of the operation to cure ulcers of the lesser curvature and hence the passage of food through the pylorus some months after the operation in duodenal cases, which may be taken to mean cessation of the spasm and cure. On the same grounds pyloric occlusion is advocated for cases of acute ulcer and after excision of chronic ulcer, conditions not associated with pyloric spasm.

Gastro-jejunal ulcer is believed to be due to the use of unabsorbable sutures in the serous layer, the last few turns of the through and through suture having failed to pick up the mucous layer and so leaving a piece of silk exposed in the base of what soon becomes a chronic ulcer. From a recent discussion in London we gather that Moynihan is of opinion that many of these ulcers are thus caused, though he is still an advocate of the hyperacidity theory. Resection and resuture of the anastomosis with catgut is the treatment advised—often a matter of great difficulty, but the author cured 11 of 13 cases by this method.

In the description of the operation of partial gastrectomy some useful practical points are given for the avoidance of injury to the structures in the gastro-hepatic omentum, the pancreas and the middle colic artery, which should be of value to surgeons who are only occasionally called upon to undertake this operation.

The subject of gallstones is dealt with at length and the different varieties of acute and chronic cholecystitis are described in great detail. The author is a whole-hearted advocate of cholecystectomy, even in badly infected cases. The descriptions of this and other operations on the biliary passages are very clear and well illustrated.

The surgical diseases of the pancreas are difficult to deal with in an interesting manner. Seventy pages are devoted to them and contain an abstract of what is known on this obscure subject.

The final chapters deal with visceroptosis in its manifold aspects. The author is conservative in his treatment and pessimistic as to the ultimate results of the numerous operations advocated for its relief. Though he admits that Waugh's operation gives good results at first, his own experience has been that there was a tendency for the symptoms to return after a time. For Coffey's operation he has a little faint praise, but in both cases he holds that these operations are only justified when the symptoms are limited to the cæcum or stomach. Ileo-colostomy and colectomy he condemns utterly, producing an array of damning figures by various writers. He himself advocates merely the division of bands and adhesions, supplemented by medical treatment and physio-therapy.

We have read this book with great pleasure and interest. The teaching is thoroughly sound and is in accord with the practice of the best exponents of the British school. We can heartily recommend the work to surgeons and to students reading for the higher examinations. The printing and paper are excellent, the illustrations are of high quality and very numerous, and a special feature is the number of charts of fractional gastric analyses and of reproductions of *x*-ray plates.

SURGICAL "DON'TS" (AND "DO'S").—By C. Hamilton Whiteford, M.R.C.S., L.R.C.P., Honorary Surgeon to the Plymouth Infirmary. London: Harrison and Sons, Ltd. Price, 3s net. Pp. 46.

THIS booklet contains a collection of shrewd and caustic aphorisms, published at various times during the past thirteen years. The reader will find here much sound advice on points in practice, with some plain speaking on professional conduct in dealing with the public. The author tilts at humbugs conscious or unconscious, whom we have all met. We commend his advice to all young surgeons.

THE OPHTHALMIC YEAR BOOK, VOL. XIX, FOR THE YEAR 1922. Edited by Edward Jackson and William H. Crisps, Ophthalmic Publishing Co., Chicago, 1923. Pp. 390.

THIS book is a digest of ophthalmic literature for the year 1922. It is composed of sections, each section dealing with a particular part of the subject prefixed by a very complete bibliography.

The book admirably fulfils its object, to provide a ready reference to the latest work on any particular branch of ophthalmology.

THE TREATMENT OF FRACTURES.—By Charles Locke Scudder, M.D., Consulting Surgeon to the Massachusetts General Hospital, formerly Assistant Professor of Surgery at the Harvard Medical School. Ninth 1923 edition, revised with 1,252 illustrations. Philadelphia and London: W. B. Saunders Company. Pp. 749. Price 42s.

SCUDDER'S *Treatment of Fractures* is a book with an established reputation of over twenty years' standing.

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More than six years having elapsed since the last edition was published, one naturally looks to see whether the great advances which were made in the treatment of fractures during the war have been accorded their due place. In this respect the book is disappointing. The author in his preface sums up the advances which have been made, but goes on to say that the new is not yet generally accepted, that some of the old is still useful, therefore he has kept it, though he recognises that much is included which is a "bit old fashioned." In a future edition he promises to eliminate everything which is only historically interesting and to confine the text to actually used methods of treatment. After this avowal, it is not surprising to find antiquated methods of treatment with flat wooden splints described and illustrated, followed by excellently illustrated descriptions of the modern methods of traction, splinting and suspension. The reader is told that the latter methods are the best, but is not given any very firm lead in the matter. Take for instance this sentence "Skin traction in fractures of the leg is coming to be recognised as rather ineffective." How ineffective it is, the author himself demonstrates in the next paragraph, by quoting a series of 35 cases treated in his own hospital and examined one to ten years afterwards, in 22 of which there was some degree of permanent disability. A similar series of cases of fractured femurs treated on the old lines and examined after the same interval, gave what he himself admits are deplorably bad results, only 5 out of 21 adult cases with perfect function. Shortening not in excess of one inch is accepted as a good result. Far better results than these are obtainable nowadays and by methods which can be carried out with quite simple apparatus. Books such as this should give the lead in discarding bad methods, not wait till the better methods have been generally accepted.

We know of no other book which contains such an instructive series of reproductions of skiagrams and for this reason, if for no other, we hope that Dr. Scudder will give us the promised new and up-to-date edition at a very early date. The opportunity should then be taken to incorporate in a preliminary general section such subjects as selection of apparatus, non-union of fractures, etc., which are now scattered up and down the book. The actual details of operative technique should be described much more fully than is done in this edition and the numerous wrong references to figures, evidence of hasty revision, should be corrected.

Only if entirely rewritten on the lines we have indicated, can this book hope to retain its position in surgical literature.

EPIDEMIOLOGY AND PUBLIC HEALTH.—A Text and Reference Book for Physicians, Medical Students and Public Health Workers. In three volumes.—By Victor C. Vaughan, M.D., LL.D., Emeritis Professor of Hygiene in the University of Michigan, assisted by H. F. Vaughan and George T. Palmer. Vol. II—Nutritional Disorders, Alimentary Infections, Percutaneous Infections. St. Louis, C. V. Mosby Company, 1923. Pp. 917.

WE do not remember having noticed the first volume of this treatise, but we regard this as an omission which should be corrected as soon as possible. The publication will be completed by a third volume on venereal diseases and public health administration.

As stated in the foreword, the present volume treats of the epidemiology and public health aspect of nutritional disorders, alimentary infections and percutaneous infections. It therefore includes a large number of diseases, many of which are tropical in distribution. The authors' aim has been to present a complete study of each disease in its historical and epidemiological aspects. They have had a very complete reference library at their disposal and it is evident that each subject has been carefully and completely studied. In the historical review free quotations are made from the most ancient and the most modern treatises. The style is clear and fluent and we have read the volume, which is a fairly big one, with pleasure, interest and profit. The intensive study of disease by bacteriological methods overshadowed for a time the older science of epidemiology, the latter, however, is an older science, is more complete, has a broader and wider scope, and embraces bacteriology, which is indeed one of its hand-maidens.

The epidemiological study of Asiatic cholera for instance led to a fairly complete knowledge of the means of spread of the disease, and preventive methods based on these were successful in checking the disease long before the discovery of the specific vibrio. Similarly with enteric fever, when it was discovered early in the 19th century that the spread of the disease depends solely upon the disposition of the fæcal discharges the main point in the epidemiology of the disease was solved. Bacteriology has aided greatly in making prompt recognition of disease possible and in detecting carriers.

The subjects dealt with are too numerous to note individually. It is sufficient to say that each is treated fully and the work should become a standard of reference for the epidemiologist. In kala-azar and epidemic dropsy the work of Rogers and Greig respectively forms the ground work for the text. In the chapter on malaria there is an interesting discussion on the effect of malaria on morality and national character and whether devastation and lack of cultivation may reduce or increase malaria. The review of Italian methods of prophylaxis is limited too much to the consideration of quinine prophylaxis. The question of exactly what is meant by "drainage" might have been more fully discussed. The authors are not as familiar with the work of Indian malariologists (e.g., Christophers and Bentley) as one would have expected. With regard to rabies franker discussion of the merits and demerits of the treatment by living virus would have been welcome. Treatment with virus killed by formaldehyde and dialysis is in vogue in America but there is no mention of the Indian work on carbolised vaccine. There is an interesting note that early in the 16th century the best authorities recommended that the suspected animal should not be killed but held in safety and that if it had rabies it would surely die within ten days.

The book is very well bound and clearly printed. The misprint of an "L" for a "T" on page 430 is confusing. The description of "L" intestinalis is obviously meant for "T" (*Trichomonas*) and not *Lamblia*. Kasauli is in several places referred to as Karauli. In the chapter on the dysenteries it is stated that there is no reason for concluding that there is a specific malarial dysentery. Many will we think doubt this statement.

In conclusion we thoroughly recommend the volume to all those interested in the history, epidemiology and prevention of disease.

NOTES ON THE TREATMENT OF MALARIA WITH THE ALKALOIDS OF CINCHONA.—By William Fletcher, M.D. Camb. Bacteriologist, Institute for Medical Research, Kuala Lumpur. Published by John Bale, Sons and Danielsson, Ltd. 1923. Pp. 91.

THIS book of less than a hundred pages should be read by every medical man who has to treat cases of malaria.

There should be little need for the book, for the most part it confirms and repeats the researches of other workers; in spite of this we would strongly recommend that a copy should be placed in every dispensary in India so that no medical man should be able to plead the excuse of ignorance in defence of the pernicious practices which are all too prevalent in connection with the treatment of malaria.

We are still far from finality in our knowledge of the treatment of malaria, further work on the lines of that carried out by Acton in Dagshai is badly needed. Millions of clinical observations have been made on the results of the treatment of malaria, but hardly any of

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them have been carried out with sufficient accuracy to make them reliable.

Dr. Fletcher makes free and full reference to the important work of McGilchrist and Acton in India as well as to the findings of many other investigators. Some of his conclusions based on careful observation of his own cases are of special interest. He finds that cinchona febrifuge in doses of 10 grains twice daily is as efficient in its individual action as quinine in similar doses, but he points out that cinchona febrifuge varies greatly in its alkaloidal strength, so that results obtained with samples obtained from different sources are not comparable.

Contrary to the usual experience he found that quartan malaria is not so prone to relapse within 3 weeks after treatment as benign tertian. He found that quinine, quinidine, cinchonine and cinchonidine in 10-grain doses *bis die* appeared to be of equal value in causing disappearance of parasites, but in smaller doses cinchonidine was decidedly less potent and cinchonine somewhat less so. Quinidine was inefficient and toxic.

Of the tasteless preparations euquinine proved effective, quinine tannate was ineffective in the usual doses.

Intramuscular injections often cause serious illness and mutilation, these results are especially deplorable in those cases in which quinine by the mouth would have been equally effective. A case came under Dr. Fletcher's notice in which a child was crippled for life from sciatic nerve paralysis, another in which the patient became incapacitated by ankylosis of the knee and ankles, and many case of abscess formation with prolonged invalidism were observed. Dr. Fletcher quite rightly insists that the considerable risk of such occurrences should only be run when quinine by the mouth is inapplicable and he agrees with the opinion which has been expressed by the writer of this review that most of the cases of failure of quinine by the mouth are due to the failure of the patient to take the drug, or to dishonest compounding.

Intramuscular injections are justified only in very exceptional cases, such as those who are dangerously ill, for those who are comatose or unable to swallow and for those who vomit the quinine.

Rectal administration has been found to be useless and excessively irritating. The dosage advocated by the mouth is ten grains of the sulphate twice daily for four weeks with a repetition of the course when relapse occurs. The routine examination of the urine for quinine is strongly advocated as a necessary and effective check on the proper administration of the drug.

Quinine resistance has been investigated with great thoroughness and abundant evidence is adduced to show the great rarity of the condition. Many alleged cases were kept under strict control, and of many such cases only one was found to be partially resistant; that case showed a partial resistance of the parasites, but clinically the result was quite satisfactory.

It is evident that in the Malay States the same excellent results are obtained by the old-fashioned methods of quinine administration as have been obtained in India, so that, while we are waiting for the ideal method of treatment, we can continue with complete confidence to employ the old and well-tried methods.

When failure occurs, the most probable explanation lies in the non-co-operation of the patient or of the compounder, not in the lack of efficiency of the drug. Far too often the inexperienced young medical man jumps to the conclusion that quinine by the mouth is useless, he should only do so when he is able to testify that the patient has actually swallowed and retained a suitable dose of the drug in a suitable form. The only point of importance which has not been stressed by Dr. Fletcher is the danger of giving pills or tablets which may be insoluble or may not be absorbed.

AIDS TO BACTERIOLOGY.—By W. Partridge, F.I.C. Fourth, 1922, Edition. Bailliere, Tindall & Cox, London. Price 5|- net. Pp. 276.

THIS little book contains a condensed summary of the study of bacteriology. Though it cannot replace a text-book, it will certainly help the student preparing for the examination. In this edition certain new things, such as standardisation of media to hydrogen ion concentration and Jensen's method of staining have been added.

A HANDBOOK OF SANITARY LAW.—By B. Burnett Ham, M.D. Edited by Henry R. Kenwood, D. P. H. Ninth, 1923, Edition. London: H. K. Lewis & Co., Ltd. Pp. 244. Price 5|- net.

THIS little book is primarily intended for the use of candidates preparing for public health qualifications, and probably every one who has appeared in a D. P. H. examination has used it.

Its size is particularly handy and the printing and paper excellent. English public health law only is considered. The various subjects of law are dealt with in separate chapters and the laws relative to these clearly stated in paragraph form, the names of the Acts and the important provisions being put in heavy type. The book has been brought thoroughly up-to-date; the Milk and Dairies Act of 1922 being included; it would have been better had the orders of the Ministry of Health under the new Milk Act defining grade A, certified, and pasteurised milk been included; the latest provisions in regard to the appointment, tenure of office and salary of medical officers of health and sanitary inspectors is included in the appendix. There is a very good index.

Although the book is primarily intended for students, it will be found extremely useful to all public health workers, enabling them to find quickly the provisions of any Act in relation to a particular subject.

Every D. P. H. student should have a copy of this useful little book, and afterwards will find it advantageous to procure the latest edition as it appears.

DISEASES OF WOMEN.—By H. S. Crossen, M.D. Fifth Edition. C. V. Mosby Co., St. Louis, 1922. Price $10·00. Pp. 1,005.

THAT *Diseases of Women* by Professor H. S. Crossen, Washington, remains a valuable and popular text-book is proved by the appearance of a fifth edition, which, to meet the rapidly expanding clinical and pathological data, has been enlarged as well as revised. Its aim is primarily diagnosis and treatment as these are likely to concern the general practitioner, but in this last edition a review of theories of ætiology and accounts of pathology have been included to bring the work up-to-date.

In the arrangement of the text can be seen the experience of a practical teacher, who never loses sight of his aim, to make clear the pelvic condition and the selection of the particular treatment. He wastes no time on gross anatomy and physiology, but starts straightway with a full description of examination methods, and with general remarks on diagnosis and treatment. Pelvic X-ray diagnosis has been considered at length, and though the method might be of occasional service, patients in India are not likely to submit to the ordeal of pneumo-peritoneum, nor does it seem free from the risks of driving pus from a tube into the peritoneal cavity and of causing abortion. After dealing with diseases of the external genitalia and vagina he proceeds to inflammation and nutritive disease of the uterus, its displacements and tumours, thence to general pelvic inflammation and the consideration of the adnexa, tumours of the ovary and parovarium. Then follow special chapters on malformations, disturbances of function and the relation of the endocrine glands to gynecology. No space is devoted to any description of the common major operations, but the points indicating any particular operation are discussed under each disease condition, and the two terminal chapters deal with recent advances in pre-operative preparation and post-operative care.

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He is in agreement with modern gynecologists that chronic endometritis is of comparatively infrequent occurrence, and clears up the confusion between hyperplasia of the endometrium—a nutritive change—and chronic endometritis,—an inflammatory change due to bacterial invasion. By micro-photographs he shows the cyclic change in the histological picture of the endometrium and all gradations between a normal hyperplasia and a distinctly pathological grandular endometritis.

He deals ably with the disturbing symptom-complex of dysmenorrhœa, and his hypothesis that the underlying condition is nutritive disturbance of both ovary and uterus explains better than any other the various phenomena observed. We question, however, the wisdom of leaving in a stem pessary "for weeks and past one menstrual period."

One of the more recent and instructive chapters is contributed by Dr. Ehrenfest on the relation of the endocrine gland system to gynecology. He is careful to differentiate proved facts, theory, and mere speculation, giving a fair review of the influence of the individual organs on the genital apparatus, the anomalies due to disturbed gland function; but realises that our knowledge is still too limited to state the exact mechanism of this correlation, and he is sceptical of the value of organotherapy as practised to-day.

The author's treatment of uterine myomata is disappointing and inadequate. Myomectomy which has come recently into vogue is dismissed in a line and he fails to state completely the relative advantages of supravaginal and total hysterectomy. He realises the grim spectre of future malignant disease of the cervix yet shuns total hysteretomy as it means "a higher present mortality and higher morbidity." A wiser security could be attained by total hysterectomy in the first instance than by his method of removing the cervical stump per vaginam after discovering malignant change in the body of the uterus removed by the less radical operation.

His teaching on the new rôle of radium and X-rays in the treatment of carcinoma of the cervix is clear and valuable. The first important point is the determination of operability, for the knife is still his first choice in early operable cases. He clearly shows, however, that radium and X-rays should not be regarded as antagonostic to operation but rather as complementary. For border line and advanced inoperable cases he gives a maximum dose of radium but presents it as a palliative measure with only a possibility of cure. He also advises a preliminary heavy dose of radium 7 to 10 days previous to the radical operation and then supplementary to this he employs deep X-ray therapy.

It is in the operative treatment of carcinoma of the cervix that he is neither definite nor convincing as to the relative advantages of the Wertheim or vaginal operations. He emphasises the importance of removing the parametrium intact and has no serious objection to vaginal hysterectomy if it includes this, but it is difficult to understand how this can be performed satisfactorily even by the Schanta-Schuckardt operation.

The chapter on pyosalpinx is interesting, but contains much that is controversial. We agree that it is *always* hazardous to operate in acute salpingitis, and that the time to operate in chronic cases is determined by the absence or persistence of virulence of the casual organism, but surely he does not mean to preach the pusillanimous doctrine *never* to operate in chronic streptococcal pyosalpinx, though that is the logical termination of his teaching that "abdominal section for a mass of streptococcal origin is *never* safe":—perhaps he is right.

In differential diagnosis he makes the interesting generalisation that streptococcal cases are usually parametrial whilst gonococcal are usually tubo-ovarian. It is just possible, however, that he is perpetuating a fallacy of American gynecology in ascribing the great majority (80 per cent.) of pus tubes to the gonococcus: the leading British gynecologists now stoutly deny that the gonococcus is so frequently to blame and our experience in India indicates *B. coli* as an important primary ætiological factor and not merely a secondary infection as he states.

The book is well illustrated, the pictures justify the space they occupy, and the micro-photographs show clearness in detail.

Though criticism of certain passages may be easy, the book remains a good one as its principles are sound, and it must be praised as providing an adequately full, lucid and practical presentation of a difficult subject.

CONTRACEPTION.—By Marie Stopes. London: John Bale, Sons and Danielsson, Ltd. 1923. Price 12|6 net. Pp. 418.

THE somewhat unsavoury subject of contraception is attracting much attention in England at present, and as it is or ought to be essentially a matter for medical men, the profession has been forced to pay attention to the question.

It is generally admitted that there are certain conditions under which contraception is desirable, even essential in the interests of the life and health of the wife: on the other hand it is pretty obvious that the practice of contraception will be employed wrongly and unjustifiably and by the very people who ought to bring children into the world. In India the idea of employing contraceptives is specially repugnant, but even here every doctor will admit that there are occasions in which a knowledge of the subject is essential to the doctor in the interests of his patients.

The book by Dr. Marie Stopes contains a great mass of information on the subject, it is said to be written for the medical and legal professions though, curiously enough, Dr. Stopes is neither a doctor nor a lawyer.

The book is of considerable value provided that the readers are clearly aware that it is not written by a medical woman and that many of the views expressed are entirely at variance from those held by competent medical men. The method which is most warmly advocated in the book is almost universally condemned by experts and one of the methods which is condemned by Dr. Stopes is regarded by most medical men as the most suitable and safe. The book contains such a mass of information that it will be of considerable value to doctors; it will, however, prove an unsafe guide to the layman and it is to be feared that laymen will constitute the vast majority of its readers.

IMPOTENCY, STERILITY AND ARTIFICIAL IMPREGNATION.—By Frank P. Davis, M.D. Second, 1923, Edition. St. Louis: C. V. Mosby Co. Pp. 168. Price 9|- net.

THIS book deals with the subject of impotence mainly from the psychological point of view. Many interesting facts are brought forward to show the powerful influence which impressions from the sense organs, particularly olfactory stimuli exert. Several entertaining stories illustrate these remarks. A large number of drugs are recommended, many of which we notice are homœopathic preparations, from which we conclude that the book is intended mainly for this class of practitioner.

A PRACTICAL HANDBOOK ON THE DISEASES OF CHILDREN.—By Bernard Meyers, M.D. H. K. Lewis & Co., London. Price 21|- net. Pp. 548.

WE welcome a valuable addition to Lewis's Practical Series in this *Handbook on the Diseases of Children* by Dr. Bernard Meyers. The range of the work is wide, and he has wisely employed the team system in its compilation. Any modern work to be up-to-date must consider the enormous advances recently made in special branches of medicine and it is equally necessary that these should be written by specialists in these branches, so we learn about "Biochemistry in Children's Disease" from one as well qualified to speak on it as Dr. Mackenzie Wallis, and about the "Physiology of Digestion" from no less an authority than Sir W. M. Bayliss. "Syphilis in Children" is contributed by Lieutenant-Colonel French

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and other very practical and useful sections are on the use of sera and vaccines by Professor Eyre, Guy's Hospital, and on "Tuberculin and Laboratory Diagnosis" by Dr. T. Jockes, St. Bartholomew's Hospital. It will be seen at a glance that the author has called to his aid the best brains of the many London teaching schools, and this is at once the work's chief merit and great defect. He is most careful in acknowledging his indebtedness and in giving credit where credit is due, but he carries this estimable virtue to the excess where it becomes a vice. It is not that the opinions of others are simply interpolated, for Dr. Meyers has co-ordinated these into a homogeneous whole, but we miss the personal touch and feel too little the individuality of the writer, and would welcome more frequent clinical cases from his own twenty-one years' experience.

In the introductory chapters he deals with the physiology of digestion, breast and artificial feeding and the clinical examination of the child. In "Nutritional disturbances of Infancy" he follows Finkelstein's classification and points out that these are largely due to faulty feeding, yet he does not sufficiently differentiate clinical types, nor fix them in the readers' mind by citing a few telling illustrative cases. He fails to bring out of the haze which befogs the student of these nutritional disorders a clear conception of definite clinical entities. More success attends his demonstration of how the vitamines are complemental to the various food constituents in the maintenance of nutrition and therefore of special interest in children's diseases and particularly the deficiency diseases of scurvy and rickets. The chapter on the internal secretions and the inter-action of the endocrine glands completes his picture of the child's metabolism and growth.

It is a difficult task to encompass the wide range of infantile diseases within the narrow limits of five hundred pages, devoting no less than three chapters to the nervous system and chapters to special diseases of the skin, eye and ear and the infectious fevers; yet the account, if not complete is none the less adequately full. With a well-balanced judgment he devotes to important conditions a few pages, while less important ones are dismissed in a paragraph. Only an author with Dr. Meyer's wide reaching and vast clinical experience could be so brief without being summary, so concise without being scrappy. We can confidently recommend this handbook to the readers for whom it was written, the senior student and the busy practitioner, as a sound working guide. The key stone of the book is its practicability, and in the concluding chapters the author shows, not merely by photo. and description, how to give saline directly into the superior longitudinal sinus, but realises that the student must know in detail how to wash out the colon and apply a hot fomentation, if he is to instruct the conscientious mother. The work leaves an impression of sound clinical and scientific observation, logical judgment and improved methods of treatment.

CENSUS OF INDIA, 1921, VOL. III, ASSAM.—By G.T. Lloyd, I.C.S. Part I, Report, 199 plus xxxv pp. Price Rs. 4-8. Part II, Tables, 373 pp. Price Rs. 7-8. Government Press, Assam, Shillong.

MR. LLOYD'S report as Superintendent of Census Operations, Assam, is a most interesting, valuable and readable document. It is also of course one which is essential to medical men working in the Province. Considerations of space prevent anything like an adequate review of such a book, but it includes a wealth of information of importance. The sections are summed up in a general introduction and deal with the population of towns and villages, birthplace with the difficult question of immigration, religion, age, sex, civil condition, literacy, languages, infirmities, caste, tribes and races, and occupations. The ravages of influenza and of kala-azar come out very clearly in the figures: whilst the Census Superintendent agrees with the Director of Public Health as to the gross inaccuracy of vital statistics. In a total population of 7,990,246 the excess of births over deaths for the decade should of course correspond with the actual census increase found: but there is a discrepancy of over 300,000 in the figures. This is due partly to the wave of immigrants into the Province who come during the decade and some of whom die before the census is taken, thus swelling the death returns but not the population figures: mainly, however, inaccuracy is what renders the statistics so unreliable.

The immigration wave is one of Assam's most important problems. On the whole it is beneficial: the immigrants from Bihar and from Eastern Bengal raise the standard of living, bring money into the Province and competition with them rouses the indigenous inhabitant from his usual lethargy. The Nepali immigrants, however, are less welcome.

Economics are in reality of vital importance in connection with questions of public health and preventive medicine, and Mr. Lloyd's general account of economic conditions among the different groups dealt with is of exceptional interest. Amongst many other interesting items in the report are accounts of tribal customs and manners, such as an account of methods of disposal of the dead, which will interest the medical man and the student of folk-lore alike.

To sum up, a most interesting and able report, written by one who has thoroughly mastered his subject.

THE DISPENSARY ASSISTANTS' MANUAL.—By Rai Hari Nath Ghose Bahadur, M.D. Calcutta: Dhanwantari Press. Price Rs. 7.

THIS is a very useful book written in Bengali with most of the medical terms in English, intended for the use of compounders and dressers of all hospitals and dispensaries in Bengal. It consists of two parts. Part I or the medical part is divided into eight chapters and two appendices and deals in a very clear way with all the divisions of materia medica, pharmacy, pharmacopœial preparations, posology, tables of doses, prescription writing, and practical compounding such as preparation of aquæ, injections, infusions, decoctions, emulsions, plasters, suppositories, pessaries, pills, etc. There is a very good diagram showing the relation between the imperial and metric system. This part ends with useful hints in cases of poisoning and two appendices containing the character, composition and uses of official remedies. Part II or the surgical part consists of seven chapters beginning with remarks on the duties of a surgical assistant or dresser. The chapters on surgical cleanliness and antiseptics are quite up-to-date. Chapter IV deals elaborately with the numerous surgical appliances, splints, drainage, etc. Then comes useful advice on the care and protection of surgical instruments, followed by a series of sections dealing with bandaging, strapping, fomentation, irrigation, injection, infusion, hyperæmic treatment and application of electricity and massage. The book ends after dealing carefully with the management, including first aid, of surgical diseases or injuries, dressing of wounds, treatment of burns and scalds and useful advice for helping in an operation. The last few pages contain illustrations for proper bandaging in different parts of the body.

We can confidently recommend this book to those for whom it is intended as it contains accurate, important and up-to-date information.

ANNUAL REPORTS.

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1921. CALCUTTA: SUPERINTENDENT, GOVERNMENT PRINTING, INDIA, 1923. PRICE Rs. 3-12.

THIS report as usual is immensely important and interesting. It is a thousand pities that a popular illustrated edition is not issued for the education of the

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general public. The limited use of charts and maps is doubtless due to considerations of economy such as threatened at one time to cause the complete abolition of the post of Commissioner of Public Health. Fortunately this calamity has been averted, but it is everywhere manifest that expenditure on public health is one of the first economies to be thought of by our administrators.

Report on the health of the British Army in India.

During the year there was a further improvement in the health of the British troops in India, though the low water mark for deaths and sickness which existed in 1913 is still some distance away. The total average strength of the British Army in India was 58,681. The admissions for cholera were 38 for the year, the case death rate, 60.5 per cent. is surprisingly high in spite of the well known fact that the disease is exceptionally virulent in Europeans. Probably facilities for prompt treatment were lacking in some cases. There were only 20 deaths from fevers of the enteric group and 9 from dysentery and diarrhœa, so that there is no great room for improvement in the mortality rates for bowel infections as a whole. Considering the possibilities of infection occurring under conditions in which control is impossible, the low death rate for bowel diseases indicates a remarkably high standard of efficiency in the measures for the prevention of food and water borne infection. In the case of malaria there is a different story to tell, the admissions for this disease for the whole of India reached the high figure of 321.7 per mille and was as high as 972.6 for Colaba (Bombay). Delhi comes high in the list with a rate of 514.5 per mille. It is believed that prophylactic measures within cantonment limits are of little avail so long as the surrounding areas are not attended to. It is interesting to note that nearly three-fourths of the cases of malaria were diagnosed microscopically. Benign tertian infections were about four times as numerous as malignant tertians and quartan infections were extremely rare. It is curious that the cases which were regarded as relapses showed a higher proportion of malignant tertian infections than the supposed primary cases. This observation is opposed to the usual experience that benign tertian malaria is more likely to relapse than malignant tertian. Another curious point is that of 709 cases of dysentery 536 were diagnosed as protozoal in nature and only 23 as bacillary, the remainder being of doubtful nature. There were 236 cases of lobar pneumonia with 31 deaths and 99 cases of bronchopneumonia with 20 deaths.

The total death rate from all causes among the British troops—under 6 per mille in 1920, was further reduced in 1921 to 4.76—showing that the health of the soldier is very efficiently looked after.

Indian Troops.—The average strength of the Indian troops was 216,445 for the year. There were 154 admissions and 81 deaths from cholera, nearly 10,000 cases of dysentery and diarrhœa with 67 deaths and 119 cases of "enteric" with 24 deaths. Considering that the Indian troops are under much less strict control in the matter of diet than British troops these figures are perhaps nearly as good as can be expected. There were 100 deaths from malaria and 145 from pulmonary tuberculosis. Pneumonia claimed the largest number of victims—431, and lobular pneumonia 213. The total death rate from all causes was just 10 per mille, a sad increase when compared with the 1910-1914 average of 4.40 per mille.

The death rate from respiratory diseases is obviously the most serious problem of the future both for British and Indian troops.

General Population.—The introductory remarks in the section of the report which deals with the general population are so weighty and so interesting that we reproduce some sections of them in full:—

"Sir George Newman in his report for 1921 writes: 'The growth and expansion of the meaning of preventive medicine is one of the characteristics of the present time.' Is there any real sign of such expansion and growth in India? Unfortunately the answer cannot be an emphatic affirmative: there is even evidence in some parts of retrogression.

The two main pillars of preventive medicine are the prevention of soil pollution and the limitation of the spread of contagion. The prevalence of hookworm disease which is a direct index of soil pollution, and the readiness and the facility of spread of contagion from place to place, province to province, and even to other countries show that India in respect of public health is, in comparison with other countries, living in a period considerably antecedent to 1922. It is clear that India is not applying knowledge, some of which has been gained by work within her territory, and that in India preventive medicine is not interpreted as it is in other countries. The modern definition of preventive medicine is 'The establishment and maintenance of individual health and the avoidance of infection or other conditions which bring about disease.' This definition is not accepted in India, for taking the country as a whole it is perhaps true to say that the main duty in health is held to be the provision of treatment for the sick to the practical exclusion of communal measures for the prevention of disease. So much is this the case that with the need for retrenchment since the advent of the Reforms the first thought in some areas has been the abolition or reduction of the department concerned with preventive medicine.

Why should this be? It is believed that the answer will be found by a reference to the history of public health advance in other countries, and applying the facts elicited to present conditions in India.

In Great Britain, as in all countries, the two main incentives to public health reform have been fear and the spirit of humanity. Fear led at times to repressive legislation aimed mainly at the affected individual, while the stimulus often died out with lapse of memory. True humanity was permanent in its endeavour: it may have been slow in securing results, but was nevertheless sure.

The pioneers of this new humanity, whose names stand out in the history of Great Britain, are the Wesleys, Wilberforce, John Howard and Edmund Burke. It was the spirit induced by the work of such men that led to the appointment of two Royal Commissions to consider public health in England. The first sat in 1843, when the country was threatened with cholera, and its recommendations were defeated very largely by a feeling among municipalities and other local authorities that local self-government meant local option—that is, the absence of central control.

The second Royal Commission was appointed in 1869 as a result of the representations of a Joint Committee of the British Medical and Social Science Associations. The present position occupied by Great Britain in preventive medicine is based on the action taken on the report of this Commission, among whose principal recommendations were the following:—

(*i*) 'The consolidation of the existing fragmentary and confused sanitary legislation.'

(*ii*) 'The administration of sanitary law should be made uniform and imperative throughout the country.'

(*iii*) 'All powers requisite for the health of towns and country should in every place be possessed by one responsible local authority.'

(*iv*) The constitution of a central authority 'charged in one of its departments with the superintendence of all sanitary authorities and equipped with a sufficient staff of officers'; (*such authority*) 'must nevertheless avoid taking to itself the actual work of local Government. We would leave *direction* only to the central power..... The new department will have to keep all local authorities and their officers in the active exercise of their own legally imposed and responsible functions: to make itself acquainted with any default and to remedy it: it will have also to discharge to a much greater extent its present duties....., namely, to

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direct inquiries, medical and otherwise, to give advice and new plans when organised, to sanction some of the larger proceedings of the local authorities, to issue provisional orders subject to parliamentary confirmation, to receive complaints and appeals, to issue medical regulations on emergencies, and to collect medical reports.'

It is noteworthy that in Great Britain it took some 25 years (1843-1868) of educative effort to secure the general acceptance of the principle of central control and that the first real advance in public health was perhaps due to the combined effort of medical men and social workers. Thus for public health advance it is necessary to have—

(*a*) the incentives of fear and humanity,

(*b*) a sympathetic medical profession and social workers,

(*c*) a popular opinion educated up to accept—

(1) a public health Act,

(2) uniform and compulsory administration of the Act,

(3) central control.

In India the incentive of fear exists. The influenza epidemic in 1918 led to demands in the Legislative Councils for more expenditure on preventive medicine. Following expert advice the Government of India decided to institute epidemiological units for dealing with epidemics. The orders for those units have been cancelled owing to financial stress, which is more potent than the transient stimulus of fear.

Humanity does exist, as is evidenced by the growth of social service organisations. There have lived and still live Indians of note, whose names will go down to history, and who have been humanitarians in a national as distinct from a provincial or racial aspect. The tendency in India is for the individual of whatever race to have a distinctly provincial outlook. It is this definite provincial as distinct from a national outlook which must prove a great hindrance to preventive medicine, for, contagion is no respecter of geographical or political boundaries. Humanity demands action not only in self-interest, but for the nation and even the world. India has yet to learn this in so far as it relates to preventive medicine.

The medical profession in India is not a united body. This is perhaps the fault of circumstances rather than of the individual. There is no Medical Act for India under which a Council for India can be constituted to exercise influence over the conduct of registered practitioners; and to raise and maintain the standard of medical education. Medical Acts are provincial, and the profession is consequently provincialised. It is noteworthy that the Medical Act of Great Britain was passed in 1858. In 1868 the voice of the profession created ten years earlier was heard in the cause of preventive medicine. Unity of the profession in India and its weight in the interests of national health would undoubtedly be furthered by a General Medical Act for India.

Sanitary legislation in India is as fragmentary and confused as it was in England in 1868. There is no pretence at uniformity in administration and little at compulsion. There is also the same opposition to central control as was evident in Great Britain in 1848. In this connection central control does not refer to control by the Government of India, but control over local authorities by the department of the provincial Government responsible for preventive medicine. Existing Acts often provide for control by a District Officer, rather than by the Department of the provincial Government concerned.

Public opinion shows no indication of being educated sufficiently to permit the universal and compulsory administration of public health law.

Taking all these facts into consideration, there can be no doubt that in preventive medicine India is not so far advanced as Great Britain was in 1869. This must be remedied if India is to enter international organisations on an equal footing with other nations. It can be remedied if the members of the Legislative Assembly as representatives of public opinion in this country realise their responsibility in this matter not only to India, but to the world.

The Government of India Act, Schedule I, Part II, states that public health and sanitation and vital statistics are provincial; subject to legislation by the Indian Legislature in respect to infectious and contagious diseases to such extent as may be declared by any Act of the Indian Legislature. Consequently, the Reforms Scheme lays on the Indian Legislature responsibility for limitation of the spread of infection. Limitation of spread is not so much concerned with measures relating to the infected individual as to the conditions under which the population lives. Thus, gross contamination of the soil leads to hookworm disease, the pollution of water supplies even at considerable distance, and to the prevalence of cholera and other bowel complaints. Conditions favouring the propagation of insect carriers of disease may lead to the wide dissemination of disease by railways, road and steamer traffic. The function of the Legislative Assembly in relation to preventive medicine is to legislate to prevent—

(*a*) the ingress of infection by sea and land frontiers,

(*b*) the egress of infection from India to other countries, and

(*c*) the spread of infection from province to province.

To avoid any possibility of misunderstanding reference is invited again to the recommendations of the Royal Commission of 1869 quoted above. The central Government must not undertake executive work, but simply see that the work is efficiently done.

An Act should lay down first, what has to be done to secure the objects in view; second, the local authorities for carrying out the duties and the areas over which each has jurisdiction, and third, financial provisions. Such an Act would form a skeleton Public Health Act for India, and would of necessity require supplementing by Acts for each province.

The function of the Legislative Assembly is not confined to legislation but includes responsibility for the efficient execution of the measures laid down. How this responsibility is to be met should be included in the Act.

It is a truism that legislation is often inoperative unless public opinion is sufficiently educated. An Act is in itself educative, and it is perhaps not too much to say that Great Britain owes in this respect a good deal to the first Public Health Act of 1848. India may or may not be ready for an Act as comprehensive as the second Public Health Act of 1872, but she is undoubtedly as ready to benefit as Great Britain was in 1848. The educative effect of legislation must, however, be supplemented by organized propaganda work undertaken by Governmental and voluntary agencies working in co-operation. Voluntary agencies for maternity and child welfare, tuberculosis, venereal diseases and general sanitation have been started. Much good should result from the newly constituted National Red Cross Society, with its 15 Branch Provincial Committees, if an effort is made to keep it truly national by reason of a wide membership embracing all creeds and all sections of society both rich and poor.

A voluntary agency is not to usurp the function of a local authority, but to initiate or supplement work with the approval of and generally under the direction of the local authority. It is often thought that propaganda work ends with lectures and exhibitions. These have their value, but for permanence in effect on public opinion are far inferior to practical demonstrations of the value resulting from approved public health methods. Campaigns over a limited area for the eradication of hookworm, cholera or malaria for instance are almost unlimited in their educative effect. Such educative demonstrations should clearly not be left solely to voluntary agencies. Governments should take their share. Any interested reader will find in the pages of this report ample evidence of the unfortunate position India occupies through the prevalence of epidemic and preventable diseases to justify the Legislative Assembly in the provision of funds for epidemiological units, which by

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dealing with the principal epidemic diseases in selected areas will demonstrate what can and should be done.

The Rockefeller Foundation of America has given the world an exhibition of the possibilities of such demonstrations. Yellow fever has in the past been a scourge for the world due to its spread by shipping from endemic centres in Central America. There has been in the past few years a feeling that the trade relations of Asia with these countries involve the danger of the spread of infection to India. Whatever may be thought of the imminence of the risk, there can be no two opinions with regard to the appalling calamity to India from the arrival of infection. The Rockefeller Foundation has conceived the idea of stamping yellow fever out of the endemic area. Commissions are at work demonstrating to local Governments and local authorities the methods which lead to successful eradication of the disease. As a result there is evidence of definite contraction of the endemic area. This lessens the risk to India. India, however, cannot depend for its immunity from disease on work done in other countries. The danger must be met by improving the conditions under which people live and work in India. The Rockefeller Foundation was founded by one commercial magnate. There are rich and public spirited men in India. Will not some come forward and assist in a real effort to stamp out preventable diseases which are influencing so adversely the health of the people of India, and the trade and prosperity of the country?

A Medical Research Institute may be opened in Delhi: reasearch adds to knowledge of disease, but this knowledge is useless to the country unless it is applied. The institution of epidemiological units based on the Research Institute will be complementary to the Institute, and was recommended by a Committee composed of official and unofficial medical experts of India. Each unit is estimated to cost Rs. 10,000 initially and about Rs. 30,000 recurring.

India is now in a state of evolution towards an Indian nation and this aim perhaps takes first place in the thoughts of Indian statesmen. It is therefore appropriate to quote the words of Disraeli: 'Public health is the foundation upon which rests the happiness of the people and the power of the State. Take the most beautiful kingdom, give it intelligent and laborious citizens, prosperous manufactures, productive agriculture: let arts flourish, let architects cover the land with temples and palaces; in order to defend all these riches, have first rate weapons, fleets of torpedo boats—if the population remains stationary, if it decreases yearly in vigour and in stature, the nation must perish. And that is why I consider the *first duty of a statesman is the care of public health.*'

Births and Deaths.

Births.—The births numbered 7,774,776 or 89,456 less than in 1920. The defect was chiefly noticeable in Bengal, United Provinces, Central Provinces and Burma.

The birth rate was 31.97 against 32.98 in 1920, and a quinquennial mean of 35.0. The number of males born to every 100 females varied from 104 in Upper Burma to 125.8 in North-West Frontier Province.

Deaths.—Deaths numbered 7,385,112 against 7,355,654 in 1920—an increase of 29,458. The excess of births over deaths was 389,664.

In Bengal, the United Provinces, Central Provinces, North-West Frontier Province and Coorg deaths exceeded births.

Infant Mortality.

1,538,937 infants died before attaining the age of one year, or 197.0 per mille of registered births.

For the chief cities the infantile death rates were:—

Bombay	667
Calcutta	330
Madras	281.9
Rangoon	322
Poona city	876
Cawnpore	580

During the past 15 years in England and Wales infant mortality has fallen from 132 to 83. The decline in mortality has been least during the first month of life, and greatest in that during the period six months to one year.

44 per cent. of infantile deaths in India occur during the first month and the mortality rate at this period is 87 per 1,000 live births, and is higher than the total infantile mortality rate in England. Effort and very laudable effort is being made in many centres to reduce this rate, but it should not be forgotten that more tangible results are likely to follow effort against the mortality of infants between 1 and 6 months and 6 and 12 months old. The mortality rates at these periods in India are double or three-fold those recorded in England. The ratio of infantile deaths to total deaths is 20.8. The corresponding ratio in England and Wales was 15.3.

A high infant mortality rate indicates (*a*) carelessness and ignorance on the part of those in attendance on the mothers at child-birth, (*b*) unhealthiness in the mothers, (*c*) unhealthy conditions in and around the homes. These three points require to be remedied if any material improvement in infant mortality is to be achieved. It should be remembered that infant mortality does not simply mean the loss of so many babies: this is serious enough. More serious still is the maiming of a large percentage of the infants who live, for, 'conditions which kill some, injure others.' A high infant mortality rate therefore means a C3 nation. India will never be able to compete in industry and other matters on equal terms with other nations while she is so seriously handicapped by the unhealthy factors killing and maiming her infant population. Not only is there unnecessary danger under present conditions to infants, but the mothers are exposed to grave risks in child-birth. Many die and others are injured permanently. These risks are to a large extent remediable. Statistical evidence of the extent of the risk is not very reliable in India, but such as it is it serves to indicate how serious conditions are. In registration a death is attributed to child-birth only when it occurs, within 14 days of confinement.

		Death rate per 1,000 births.
Delhi City		6·8
Bombay City	All causes	24·8
	Puerperal fever only	19·3
Calcutta	All causes	25·02
England and Wales		3·91

These figures speak for themselves, and should make every educated man think seriously. Why do these women die? Take Bombay city—here 77 per cent. die of puerperal fever, a disease due to ignorance, carelessness and lack of cleanliness on the part of those in attendance before, during and after labour. Carelessness, dirt and ignorance are in these enlightened days inexcusable. It should be recognised in India, as it is in all civilised countries, that 'every woman should be able to obtain skilled and competent professional assistance from doctor or midwife, before and at her confinement, either in her own home if the home environment be reasonably satisfactory, or in a properly equipped Maternity Home or Hospital.'

In how many cases is the home environment reasonably satisfactory in India? For answer turn to the speech made in the United Provinces Council Chamber last March by the Hon'ble Pandit Jagat Narayan, Minister for Local Self-Government. 'May I know whether we ourselves are not the greatest sinners in this respect? Will it be possible for an ordinary *dai* who is taught sanitary and hygienic methods to practise them? I say no. And if anybody joins issue with me then I can prove that our manners and customs will stand in her way * * * We are wholly responsible for the insanitary conditions prevailing in our houses.'

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Would that this responsibility were generally realised. The above extract brings out the point which is so often forgotten; that results from maternity and child welfare work are masked because the two main pillars of preventive medicine—a clean environment and limitation of spread of contagion—have not received sufficient attention.

Schemes for Maternity and Child Welfare.

(*a*) *By voluntary agency.*—Three all-India Voluntary Societies are at work:—The Victoria Memorial Scholarship Fund: the Lady Chelmsford League for Maternity and Child Welfare, and the newly organised Indian Red Cross Society.

The Victoria Memorial Scholarship Fund deals only with the practising *dai*. During 1921 the income of Rs. 85,000 was derived from a Government subsidy of Rs. 46,000, and interest on investments. Grants were made to 21 centres for the training of midwives and totalled Rs. 41,703. Under the auspices of the Fund certain books and pamphlets have been published and models prepared for use in classes for training *dais*.

The Lady Chelmsford League has four main objects—

(*a*) Education of health visitors and maternity supervisors.

(*b*) Propaganda by means of travelling exhibitions, publications, etc.

(*c*) Encouragement of formation of provincial branches.

(*d*) Grants to welfare centres.

A training school for health visitors has been opened at Delhi and up to the end of 1921, 26 students had passed through the School and 15 had obtained appointments.

Under propaganda literature, pamphlets and posters are prepared: a journal is published and a travelling exhibition is being prepared.

Associations affiliated with the League have been started in Madras, Rajputana and the Punjab. Further applications for affiliation have been received.

The welfare centres in Delhi and Simla to which substantial grants are made are doing excellent work and are gradually gaining the confidence of the public.

The Indian Red Cross Society has only recently been established. If it can secure a really wide membership its potentiality for good in public health generally will be almost unlimited. A promising start in child welfare work has been made in Bengal where one of the branches of the Society under a strong Committee is devoting attention to child welfare work. In co-operation with the National Indian Association a clinic has been started, and in connexion with this is a milk kitchen.

(*b*) *By Governmental (including municipal) agencies—Bombay city.*—Twenty municipal nurses, all qualified midwives, are at work: ten of these were appointed during 1921.

Of the confinements 56.8 per cent. were attended by unqualified women: 5.1 per cent. by qualified nurses other than municipal and 9.5 per cent. by municipal nurses. 24.4 per cent. of infants were born in hospitals. The 3 Municipal Maternity Homes providing 55 beds are becoming more popular: 1,444 women were confined in them showing an increase of 110 over the figure for 1920. Proposals for three additional maternity homes are under the consideration of the Corporation. The municipal nurses visit the homes, and during 1921 paid 35,968 such visits, and entered the homes of 61 per cent. of the infants born.

An enquiry into the employment of women before and after confinement was opened under the Countess of Dufferin Fund. Nearly 31 per cent. of mothers left home for work and their children to the care of others.

Calcutta.—The city is divided into four circles, each with a staff of a health visitor and 4 midwives. Between them they attended 3,208 maternity cases, or 1 out of every 6 cases in Calcutta. Only 9 women attended by the municipal midwives died. This is a remarkable demonstration of the value of the trained midwife. 104 difficult and complicated cases of labour were treated in hospital.

Babies are visited daily for 10 days, and at least twice during the following 10 days. After this they are kept under observation for three months.

Causes of Infant Mortality.

The figures for Bombay city may be taken as a general indication of the causes of infantile deaths. Out of 12,751 infantile deaths, 4,507 were due to diseases of the respiratory system, 4,395 to infantile debility, malformation and premature birth, 981 to bowel complaints, 78 to dysentery, 254 to malaria, 77 to small-pox and 66 to measles.

A considerable proportion of the deaths was therefore caused by factors which can be remedied, that is unhealthy surroundings and spread of contagion. This should be remembered, for unless they are remedied those who expect immediate and startling returns from maternity and child welfare schemes will be disappointed. In Great Britain the first drop in infantile mortality was due to the improvement of the surroundings of the homes. Organised attempts to affect this improvement should be conjoined with child welfare work proper. In England the object of the welfare centre is the supervision of the healthy child and the education of the mother. In India a third object is often found necessary as the children are so often unhealthy, and the centre tends to develop into a clinic. Education of the mother will, nevertheless, continue to be a main function of the centre, and combined with house visiting must aim at teaching the mother how to secure healthy surroundings. The centres will then be doing work of inestimable value to the country.

Fevers.

More than half the deaths are included in the group, 'fevers.' 4,761,237 were registered under this head against 4,931,202 in 1920 and 5,468,181 in 1919.

In Bengal and the United Provinces a large majority of fever deaths are attributed to malaria, while in Burma and Assam towns the percentages of malaria deaths to total fever deaths are 44.8 and 44.6, respectively.

A disturbing feature of the year is the increased incidence of malaria in Bombay city. The total deaths from malaria rose from a decennial mean of 264 to 545. The splenic and parasitic indices exhibited similar rises. The increased incidence was widespread. Out of 2,274 wells examined for larvæ 607 were found to be breeding larvæ; owing to a scanty water supply the coverings to cisterns were broken and in this way suitable breeding places were created.

The seasonal mortality for fevers yields indications which are of value. Thus there are two definite waves every year; the first between March and June and the second between September and the end of the year. The second wave is very largely malarial, but the first is certainly not malarial in every case. There is a certain amount of evidence which suggests that the first or spring wave is influenced largely by relapsing fever. Lieutenant-Colonel Gill, Chief Malaria Officer in the Punjab, has estimated from the statistics of 1920 that the deaths in the Punjab from relapsing fever in 1920 amounted to at least 26,000. Major Cragg has come to similar conclusions about the incidence of relapsing fever in the United Provinces.

The deaths recorded from relapsing fever give no indication of its prevalence. Epidemics occurred in parts of the Central Provinces, and it is possible that in some areas it is confused with influenza. Relapsing fever was unrecognized in the Madras Presidency till November 1921, when undoubted cases were found in the Remount Depôt at Hosur. An epidemic occurred in the Tanjore district in March 1922.

The real cause of the spring wave will well repay investigation, especially if it be proved that it is largely due to relapsing fever. In this case such a simple measure as 'disinfestation' will help in reducing sickness and death. The war necessitated the production of a cheap,

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portable and simple apparatus for disinfection, and a current steam disinfector is now on the market which can be carried on a man's back or on a bicycle. An apparatus of this kind should prove invaluable in India, and, after its utility and economical use has been proved in India, should be in the hands of every local authority in India. The work of demonstration might well be taken up by a voluntary organization, such as the Indian Red Cross Society.

The incidence of typhus fever is unknown. It has for years been recognized in submountain districts, but how far it affects the general population is a matter of doubt. The epidemiological units referred to in the introductory remarks could in a comparatively short time provide valuable information on the incidence and distribution of these two diseases and the almost certain saving of sickness and death would more than repay the cost of maintenance.

Kala-azar is a local disease, the deaths from which have been reported as follows:—

Assam	2,987
Bengal	1,552
United Provinces	168
Madras City	24

The figures for Bengal and the United Provinces are certainly gross underestimates.

In Assam kala-azar work has absorbed the greater part of the energies of the Department. Eight assistant surgeons and 35 sub-assistant surgeons were on special duty. Accommodation for 382 in-door patients was available. For out-patients there were 23 special dispensaries, 33 subsidiary treatment centres, and 6 Government and 43 Local Board dispensaries. The total number treated during the year was 15,880, of whom a certain number were, in the opinion of the Director of Public Health, cases of chronic malaria.

However efficient treatment may be, the disease can never be eradicated entirely thereby, so long as the chance of re-infection due to unsatisfactory surroundings exists. The Director of Public Health rightly points out that infected families should be removed from infected sites owing to the known persistence of site infection. Removal of village sites is an expensive measure, but is the only means of eradication of the disease under existing knowledge. Its expense renders its wide application impracticable. It is to be hoped that the investigation into the carrier of the disease now being carried out under the Indian Research Fund Association will be crowned with success, for, until the carrier is definitely known, prevention is more or less empirical.

In Bengal the kala-azar survey continued, and 639 infected villages were found out of a total of 2,807 examined in 13 districts. The average number of cases per village was 2. The cases were mainly among men.

These facts indicate the desirability of investigating the main cause underlying the spring rise in fever mortality. It is perhaps not too much to say that although the heading fevers includes undiagnosed cases of practically all diseases connected with fever, the two main diseases for India as a whole are relapsing fever and malaria. The eradication of the former is a question of disinfection and personal cleanliness: of the latter efficient treatment of the sick, and anti-mosquito measures which may involve major drainage works costing large sums.

The efficient treatment of the sick is intimately connected with the demand for quinine and consequently its market price. The market price of quinine has fallen to some extent, but it is still too high to permit of more than a small percentage of sufferers from malaria receiving an amount sufficient to cure. The work under the Indian Research Fund Association of Major Sinton, I.M.S., on the most economical and efficient method of administering quinine is therefore of the highest importance to India and deserves the close attention of all engaged in treating malaria cases. Even should his work lead to a smaller weight of quinine per case being used, there is no doubt that the efficient treatment of all malaria cases in India would make a serious inroad on the world's supply of quinine and tend to raise the market price. A standard treatment for India is desirable both for efficiency and economy.

The only radical method of overcoming the tendency for demand to increase the market price is for the Government of India to undertake cinchona cultivation sufficient for the needs of India. This policy has received much attention in recent years. Should the new area under cultivation in Burma prove successful there is hope of ultimate realisation. At present quinine production in India depends on areas of cinchona cultivation under the Bengal and Madras Governments, which can only supply a fraction of the present demand. There can be no question but that the provision of a cheap quinine for the needs of all India is a function of the Central Government, and it is satisfactory to note that in cinchona cultivation action has been taken. The Government of Italy has shown what can be done in malaria control by centralising the issue and manufacture of quinine products. There is considerable profit in the enterprise, and this profit in Italy is ear-marked for anti-malarial work. If this system were adopted in India the profit realised by the sale of quinine should be available for anti-malarial work over the whole of India, and not be limited to those Provinces in which the cultivation of cinchona is possible.

Apart from the treatment of patients in hospitals and dispensaries the following measures were taken to bring quinine within the reach of the people:—

Bihar and Orissa.—664 lbs. were sold mainly through the agency of postmasters. Owing to the high price of quinine it is proposed to substitute cinchona febrifuge.

United Provinces.—Quinine to the value of Rs 15,067 was sold by post offices, and other officials. 209 lbs. of quinine were issued for free distribution for curative treatment in malaria infected districts. Prophylactic use was limited to the police and to some schools, for this purpose 119 lbs. were used. 300 lbs. were supplied to travelling dispensaries.

Punjab.—No actual figures are available, but local bodies distributed a good deal free of cost.

Central Provinces.—1,582 lbs. of quinine were issued by the jail factory mainly in the form of 4 grain tablets for sale by vendors. In poorer tracts quinine was given free. The epidemic dispensaries treated many cases in districts in which malaria was very rife towards the end of the year.

Bombay Presidency.—The sale or free distribution of quinine by district local boards, municipalities and post offices amounted to 2,949 lbs. The local Government provided Rs. 49,084 for the purchase of quinine, and quinine tablets to the value of Rs. 33,000 were distributed free to the general public and to school children.

Burma.—Cinchona febrifuge was issued in place of quinine. About 3,030 lbs. were used in all, of which 60 lbs. were distributed free. In future the drug will be issued in the form of 'treatments,' instead of as separate tablets.

These figures show how much yet remains to be done to make quinine readily available to the mass of the population in India."

Anti-Malarial Measures.

In connection with anti-malarial measures it is interesting to note that there is a tendency for industrial organisations to call in the help of experts to advise as to the prevention of the disease.

Lieutenant-Colonel Christophers visited sugar estates in Kamrup and a scheme in accordance with his advice is being worked out. There is vast scope for work of this kind in India and it is disappointing to find that the measures taken in connection with the great Sarda Canal scheme are dismissed in less than four lines of the report. When the vast importance of anti-malarial measures in connection with such a work is realised it is

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obvious that a magnificent opportunity for a demonstration of the value of modern methods of prevention of disease is offered and it would be interesting to know what advantage is being taken of this.

The only place in which definite results are recorded is Bengal where the Jungipur flood and flush scheme is reported to have reduced the spleen index and to have been attended by a considerable improvement in the general mortality.

On the whole the measures which have been taken to cope with the most important disease of India are disappointing, and we fear that they would not receive the commendation of the father of malaria prevention—Sir Ronald Ross.

The death rate for respiratory diseases is obviously greatly understated for India as a whole, it is only in the great cities that any appreciable mortality is reported, and it is clear that much of the mortality for respiratory disease is included in the heading "fevers."

Cholera.

The number of deaths registered from cholera, came to 450,608, giving a death rate of 1.87 per mille. It was a bad year for North-West and Central India, and the North-West Frontier Province, Punjab, the United Provinces, Central Provinces and Delhi suffered very severely.

Cholera is another disease which has not yet been tackled seriously in India. We read of the curtailment of the organisations which had already been formed owing to "financial stringency" and it looks as if the potentially most productive industry in India—preventive medicine—were being strangled by false and short sighted economy.

Dysentery and diarrhœa are said to be responsible for over two million deaths, an estimate which is probably much below the actual mark. Small-pox is the one disease which has been dealt with in a reasonably thorough manner in India with the result that the deaths amount to the trifling figure of 40,446. This figure is nothing to boast of, but it constitutes a mere fraction of the death rate which would certainly occur if vaccination had not been adopted and persevered in as a means of controlling the disease.

Plague.

The year witnessed another great reduction in the incidence of plague: only 69,682 deaths were reported in British India and 11,839 in Indian States making a total of 81,521. The mean mortality calculated on 20 years is 500,000 approximately. In 1920, 140,259 deaths were registered. These figures must not produce too sanguine a spirit: the reduction is not due to preventive measures entirely, but perhaps mainly to natural causes such as unfavourable climatic conditions, scarcity of food and perhaps a growing immunity among rats. The increasing death rate in towns, for instance in Bombay city the deaths numbered 807 against 281 in 1920, and the existence of a larger number of infected foci towards the end of 1921 indicate the possibilty of enhanced mortality in 1922-23, provided climatic and agricultural conditions are not unfavourable. This possibility renders the abandonment of certain experimental investigations by reason of financial stress all the more regrettable. These experiments will be referred to later.

Plague, which has killed over 10 million people during its present visitation, will undoubtedly disappear as it has always done in the past. There are indications, however, that it will cause a great many more deaths before it departs. What is to be done? Obviously the only radical cure for plague is the improvement of housing and methods of storing grain, so that rats and man will not live in intimate association and rats will not have free access to grain.

Town improvement is a radical measure, but slow and costly. Large sums of money have been spent on many cities, but much remains to be done before any of them can be considered proof against human plague. Town improvement schemes should be pushed with such vigour as money permits, for they will ultimately influence materially the incidence of plague. In addition attention to improvements in grain storage and the destruction of rats must be given. There has been a great demand for copies of the note by Dr. Chitre on improved methods of rat destruction and of the plan for a rat free-godown designed by Major Norman White. This demand has been met and it is to be hoped that some advance may result. Some say that rat destruction is expensive and unprofitable for it has to be continuous. This is partly true but it has not to be continuous throughout the country: the special operations in Belgaum and Dharwar districts tend to show that intensive operations in specially dangerous towns and villages for a portion of the year may ward off an epidemic. It is well to remember that the cost of killing a rat does not compare with the price of the food of a live rat.

Ankylostomiasis.

Bengal.—The special investigation was discontinued in March. The results obtained are tabulated.—

Area.	Percentage of infection.
Burdwan Town ..	.. 31.3
Burdwan rural area ..	.. 53.6
Police	.. 61.3
Prisoners	.. 68.06
Mills and factories ..	.. 74.3
Tea gardens and coal areas	.. 78.3

Madras.—A detailed enquiry under the Indian Research Fund Association has revealed the following figures:—

1. Districts—
   (*a*) Wet cultivation, 96 to 100 per cent. infected.
   (*b*) Dry cultivation, 66 to 83 per cent. infected.
2. Schools, 55 to 87 per cent. infected.
3. Jails, 89 to 97 per cent. infected.
4. Industrial population, 91 to 94 per cent. infected.
5. Tea Estates, 100 per cent. infected.

Instructions for conducting a campaign against the disease will be issued by the Provincial Public Health Department shortly.

Central Provinces.—An investigation among prisoners indicated a percentage of 31 infected.

During 1921 the employees at the Empress Mills, Nagpur, were examined, and 10.59 per cent. were found to be infected. The sanitary arrangements at the Mills are described as very good.

Burma.—Work in the jails was continued during the year and a percentage rate of infection of 67.43 was found.

The enquiry by the Indian Research Fund Association is still proceeding and it is hoped that a concise report, including the use of carbon tetrachloride in treatment will soon be available for distribution. Detailed reports have been published in the *Indian Journal of Medical Research.* Much more definite information regarding the incidence of infection over India generally is required, even if this information at first only results in efficient treatment of some of the sufferers. Although eradication of the disease depends on the limitation or control of soil contamination, much can be done to limit the special contamination of the soil by mass treatment. The work under the Indian Research Fund Association will enable this to be done in those areas for which the money can be found. If only the educated portion of the community could realise that the indiscriminate soil contamination which is practically universal in India, results in an incalculable amount of sickness, and a large number of preventable deaths every year some real advance in this fundamental principle of public health and cleanliness would result.

Leprosy.

Accommodation for about 5,000 lepers is available.

In Bengal consideration is being given to the construction of a Leper Colony for 1,000 patients.

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The Indian Research Fund Association is conducting a special enquiry into the efficient treatment of leprosy.

Fairs and Festivals.

Reference has been made in former paragraphs to the spread of infection from various pilgrim centres, notably, Hardwar, Ujjain and Godavari, which occurred during 1921. The progress of major sanitary works in some of these centres has been delayed possibly by financial conditions. The urgency of placing all pilgrim centres on a sound satisfactory basis is intensified by the rapidity with which infection is broadcasted by railway travel. Dissemination by road traffic is less rapid, but none the less certain, and tends to be more or less localised. The sanitary conditions of the railways and roads is therefore also a matter of vital importance to the general population of India.

Defective sanitary arrangements at pilgrim centres, on railways and main roads means rapid conveyance of infection all over India, and the results of such dissemination of infection are difficult to deal with when the local sanitary arrangements are not up to the mark. Such local arrangements are provincial matters: the spread of infection by railways and roads, and to some extent by pilgrim centres (for pilgrim centres attract pilgrims from all over India) are certainly matters in which the whole of India, and consequently the Government of India is interested. This is recognised in all Federal countries and the duty is met by legislation. In India such an Act is very necessary.

1921 saw the close of the Sinhast Festival in Nasik. The last festival was in 1908-09 and was the occasion of a devastating cholera epidemic, the influence of which was felt over the greater part of India. It is satisfactory to note that the 1920-21 festival passed off without such incident. Since the previous festival a piped water supply has been introduced, and various major sanitary works completed, but these in themselves could not have resulted in such complete immunity had not the organization at Nasik been excellent. The result reflects the greatest credit on all concerned, especially the Assistant Director of Public Health, Dr. J. Munsiff, and is a practical demonstration of what can be done in India by the application of modern public health principles.

Mention must also be made of the Ganga Saugor mela held in January. Cholera was prevalent in Calcutta at the time, and cases occurred on the steamers and country boats conveying pilgrims to the mela. There was no spread of the disease, which is proof of the satisfactory arrangements made under the supervision of the Port Health Officer, Calcutta. Attention was concentrated on the purity of the water supplied to the pilgrims, and the experience of this mela is a practical demonstration of what can be done to limit the spread of epidemic cholera by attention to this one essential—the quality of water which pilgrims drink.

Medical Inspection of Schools.

In the Bombay Presidency 6 medical inspectors were appointed for different areas. Work commenced in July and covered the examination of 6,574 pupils in 43 schools of the Bombay Presidency proper. 1 per cent. were found to be suffering from some forms of tuberculosis: 11.5 per cent. from defective vision, and nearly 3 per cent. from eye disease; under 2 per cent. from defective hearing, 13 per cent. from adenoids or enlarged tonsils; over 7 per cent. from caries of the teeth or septic mouth conditions, and 9 per cent. from some form of skin disease.

Mines.

The Asansol Mining Settlement in Bengal is controlled by a Board of Health, who are taking steps against malaria, for the treatment of hookworm disease, and for the reduction of infant and maternal mortality. During the year the births numbered 8,280 and the deaths 7,993. The infant mortality rate was 170. The principal causes of deaths were cholera, fevers, and respiratory diseases.

Bihar and Orissa.—The sanitary control of the Jharia and adjoining coal mining area is in the hands of the Jharia Mines Board of Health, who employ a medical officer of health. Great improvement has been made in housing and water supply.

The average daily population of labourers is 83,801. Influenza, small-pox and cholera prevailed to some extent during the year, but the incidence was less than in the Province as a whole. About 50 per cent. of the men examined exhibited hookworm infection, and some 317 cases were treated.

Burma.—The Burma Corporation employs a medical staff. Steps have been taken to improve and extend the piped water supply. Supervision of food, including milk, is exercised. The arrangements for isolation and treatment of cases of infectious diseases are being improved. There is no system of birth and death registration. Malaria, dysentery and influenza caused trouble during the year. 40 cases diagnosed as bad colic were treated, but there were no cases of severe plumbism. A few cases of relapsing fever, the infection of which was imported from China, occurred among the Chinese labourers.

The mines in Tavoy and Mergui districts are inspected by the Civil Surgeons.

It is only possible to refer to a few of the outstanding features of this very valuable report which reiterates the appalling devastation and loss of efficiency which prevail in India from preventible disease.

The whole future of the country depends on the resolute tackling of the vast problem of disease prevention and improvement of the economic condition of India, but the Government and people of India have become so accustomed to the old story of poverty and death that they accept the existence of these conditions as a commonplace. The awakening of an administrative and national conscience cannot be effected merely by a statement of the facts. A loud and continuous note of alarm must be sounded and the country must be brought to a realisation of the dreadful existing state of affairs before desire for reform can be brought into being.

The Public Health Commissioner's report states the facts in so far as they are available in a full and clear manner, but there is nothing whatever to show that Government attaches any importance to the report. The abolition of the post of the "recording angel" was even contemplated recently by the retrenchment commission, possibly on the principle of sitting on the safety valve. What is needed is a thoroughly competent and influential commission of enquiry into the whole subject of poverty and disease, the sooner this is instituted the sooner will India cease to be one of the disfiguring blots on the face of the earth.

ANNUAL PUBLIC HEALTH REPORT, BIHAR AND ORISSA FOR THE YEAR 1922,

By W. C. ROSS, M.B., Ch.B. D.P.H.,

LIEUT.-COLONEL, I.M.S.

Patna: Supdt., Govt. Printing, Bihar and Orissa.

THE year 1922 was an exceptionally healthy one in Bihar and Orissa; the death rate being only 24.1 per mille as compared with 35.8 in the previous ten years, and the birth rate 34.6 per mille; whilst the total number of births exceeded the total number of deaths by 370,000. There was further, a complete absence of any great epidemic or of special endemic prevalence of infectious diseases.

The total population of the province was 34,002,189 and the total number of births recorded 1,191,425. Dhanbad and Giridih returned the low birth rates of 11.1 and 12.7 respectively, but this was probably due to the floating character of their labouring population in connection with the coal mines and the excess of males over females in such labour. High death rates in Lalganj, 42.5, and in Balasore and Cuttack, 37.2 and 30.2, respectively, were due to plague, to fever and to cholera. Katihar, which returned a death rate of only 5.9, and

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Dhanbad, which returned one of only 6.0 returned statistics which are obviously inaccurate. In 57 municipal towns where registration is compulsory the accuracy of registration of 25,935 vital occurrences was investigated; 2,202 omissions were found, 312 prosecutions were instituted and no less than 207 convictions obtained. In brief, writes Colonel Ross, vital statistics are the barometer for public health work in a province, and accuracy in such matters is as important to the public health official as accuracy in his compass to a ship's master at sea. Further, such figures go hand and hand with the economic state of the population concerned; "if public health is to improve, progress and effort are essential, and these imply organisation, the spread of knowledge, and expenditure. *The expenditure is the immediate difficulty which has been allowed to dominate the situation too long. It appears to create a vicious circle: the people are poor because they are not healthy; and they are unhealthy because they are poor: they cannot afford to pay to acquire public health; therefore nothing can be done*".....We have rarely seen the real situation put more forcibly.

"This is where public health becomes an economic question," he continues. "Let us not look on the difficulties and not be disheartened by the apparent impossibilities. Let us rather accept the proposition that public health is an economic question and must be dealt with accordingly. Let us admit that we *must* have the funds to meet the expenditure which we know must be incurred if we are to make any real progress, and let us consider how we may obtain these funds, rather than waste time in tinkering with the health of the people." A statement of the facts with which every public health worker in India will agree.

Of special diseases in the province, cholera is ever of importance, especially in connection with the annual Puri festival. The annual cholera rate fell from 2.6 in 1921 to 0.7 in 1922. Special preventive measures were taken and special staff employed at the Puri festival and at Sonepur Fair. A special epidemic cadre of 10 sub-assistant surgeons has been sanctioned in this connection, but it was found impossible to recruit this strength, and 6 assistant surgeons had to be employed to make good the deficiency. These officers were established at Patna as headquarters and were sent out throughout the province to any place where an epidemic threatened,—a foreshadowing of the scheme for the establishment of special epidemic units throughout India, which was formerly decided upon at Simla, but which the recommendations of the Inchcape Commission rendered impossible. A special epidemic reserve of 100 vaccinators was also entertained from April to September for cholera or other epidemic duty.

Cholera tends to become epidemic in Bihar and Orissa between March and October,—the average annual mortality being no less than one lakh of lives. Climatic conditions are especially suitable for its spread and density of population, especially in Bihar, renders its spread rapid. It can be shewn that the rapidity of spread of such an epidemic disease is of the nature of the formula N^2-N; so that if N be unity there is no spread, whereas if N be any high figure, the spread is almost in proportion to the square of the number of cases present at any given moment. Whilst segregation, inoculation and the chlorination of water supplies are all valuable measures, the question of fly transmission should not be lost sight of. Promptness in reporting cases, in recognising the disease when it first appears, and in assembling together the staff needed for an anti-cholera campaign are the measures most essential.

Small-pox was unimportant during the year, but it is noted that vaccinations shewed a falling off, as compared with the previous triennium. The death rate from fevers was 17.0 per mille as compared with 22.6 in 1921. The year was in general a healthy and prosperous one, and malaria and other fevers were at a minimum. On the other hand the chart of fever incidence shewed an unexpected feature,—a maximal rise in May, very unlikely to have been due to malaria. Influenza may be practically discounted, and special steps were taken to investigate whether relapsing fever was responsible; the results were negative. Further investigation of this question is called for.

Malaria and hookworm constitute the two most important problems of the province, and Colonel Ross notes that, in the first place, he considers that quinine prophylaxis on a large scale would be practically useless in connection with the former disease. Large engineering works and extensive drainage operations are out of the question, owing to scantiness of funds. What is wanted is an anti-malarial policy which will pay its own way. Such a policy is possible; indeed it is already being carried out in Italy and Spain. It consists of combining agricultural improvement with sanitation, by draining or flooding marsh lands in such a way as to produce larger crops and at the same time reduce anopheline breeding. (And—if any further illustration be needed—we may point to the examples of Algiers, which by intensive agricultural cultivation has of recent years been converted from a malaria-ridden country to one which is now a health resort, and—on the other hand—to Corsica, where, with extensive de-forestation and a policy of *laissez-faire*, a previously healthy costal belt has now become a malaria-ridden haunt.)

Plague was of very minor importance during the year, but Colonel Ross notes on the good effects of the voluntary evacuation of infected houses combined with inoculation. Both respiratory diseases and dysentery and diarrhœa also shewed a marked decline in incidence. With regard to ankylostomiasis, it is noted that investigations at the Patna Lunatic Asylum and in the Central Jails at Bhagalpur and Buxar shew an infestation of from 50 to 70 per cent., and that successful treatment is only one aspect of the problem,—the provision of suitable latrine accommodation being equally important.

With regard to propaganda work, considerable advances have been made. The three Assistant Directors of Public Health and the officer in charge of the Public Health Bureau give lantern lectures, and 192 such lectures were delivered during the year in towns and villages. The twelve most important towns of the province had previously been provided with health officers, but municipalities in general seem unprepared to pay for their services, and the number employed during the year fell to six. (It appears that municipalities in general will not pay for expert advice, but prefer to crawl along on the well-established line of petitioning Government for everything, for funds for water supplies and drainage schemes, for the services of public health experts, for remission of taxation; in a word they fail entirely to realise either their own responsibilities or their opportunities. Devolution may be the order of the day in India, but devolution of public health matters from Provincial authorities on to municipal boards means still further devolution on to their conservancy personnel, who are scarcely sufficiently educated to realise the importance of the problems involved.)

The six school medical officers inspected 172 schools and delivered 1,279 lectures. Dr. J. L. Das, in charge of the Public Health Bureau, delivered 30 lantern lectures and issued numerous pamphlets and press articles. Dr. G. W. Thompson, Medical Officer of Health, Jharia Mines Board of Health, reports steady and continuous improvement in sanitary conditions in the mining areas, and especially the extension of the use of aqua privies.

"Sanitary progress," writes Colonel Ross, "is, as it has always been, slow and disappointing.....It is not ignorance but inertia which is the real cause of such slow progress.....People do not recognise that the improvement of public health is a paying proposition,—that wise expenditure brings in a great return..... Health, like any other commodity, is purchasable, and in accordance with the economic law, one can only obtain the quantity and quality for which one is prepared to pay." And he goes on to emphasise that three essential factors are requisite for any further progress:—(*a*) economic progress to produce the means to meet the necessary expenditure; (*b*) education of the public as

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to the value of sanitary and public health measures; and (c) legislation, to control and direct local administration in public health matters and to provide legal sanction for enforcing public health law.

We have rarely seen the real problems of public health work in India better expressed. To legislators in a frenzy of economy it may seem that economy may be readily effected by reducing public health grants. The wiser policy,—were anyone aware of it,—would be to broaden the basis of taxation so as to meet such beneficial expenditure.

Correspondence.

INSULIN IN THE TROPICS.

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—Since writing, with Dr. Douglas, the article on deterioration of insulin which appeared in the January number of the *Gazette*, I have had the opportunity of testing further samples. Those stored in India have all been found much below the original standard, but a special consignment sent direct from London to Rangoon in cold storage and placed in cold storage on arrival was found to be of the full original potency.

Three units of this consignment produced the required lowering of the blood sugar in a rabbit of 1,000 grammes and convulsions in 2 hours.

Certain irregularities have been found in testing the insulin on rabbits and any rabbit with a high glycogen reserve is unsuitable for the purpose. I now select rabbits which are somewhat thin and weigh as nearly as possible 1,000 grammes and whose blood sugar after 24 hours' starvation is not over 0.12 per cent. With rabbits starved for 24 hours and their blood sugar not estimated before injection of insulin, I have found that some among the series will remain unaffected by several times the dose which will produce convulsions in others. The intravenous route is always selected for injection of insulin in tests and the blood for sugar estimation taken by heart puncture with a tuberculin syringe. It is satisfactory to know that import in cold storage will result in retention of potency, and the study of the further results of storage under different conditions in India will put us in a position to obtain the best results.—Yours, etc.,

J. TAYLOR,
Major, I.M.S.

PASTEUR INSTITUTE,
RANGOON:
15th January 1924.

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—An editorial note affixed to page 583 of your December issue states that information has been received that many samples of insulin which are on the market are seriously defective, and that an important note on the subject has been crowded out of the current issue of the *Indian Medical Gazette*.

As no brand or make of insulin has been specified in the paragraph referred to above, the inference is that all brands of insulin are suspect, and, until fuller particulars are published, physicians in India will naturally hesitate to employ any.

We take this opportunity to inform you that we have only this week received a report from our London laboratories to the effect that tests recently made show that 'Wellcome' brand insulin will withstand temperatures much higher than those to which it would be subjected in India, even during the hot season, without appreciable reduction in therapeutic activity. Prof. MacLeod of Toronto is reported to have said that insulin supplied by the picrate process, which is that employed in making 'Wellcome' brand insulin, can even be *boiled* without destroying its efficacy.

The first supplies of 'Wellcome' brand insulin received at this office arrived on the 18th October, from which date it has been stored in a refrigerator at a constant temperature of 60 Fahrenheit. These facts would indicate that the specimens of insulin which are alleged to be "seriously defective" cannot have been 'Wellcome' brand products, and we beg that you will make that point clear in the next issue of the *Gazette*.

We take the liberty to send you herewith two specimen tubes taken at random from the first shipment of insulin which we have received, and we shall be obliged if you will subject them to clinical test.

The home demand for 'Wellcome' brand insulin was so great up to last September that it was not found possible to issue any of the product to India. Plentiful supplies are now available for export and we have no reason to believe that this product will deteriorate provided ordinary care is taken in storing it.—Yours, etc.,

BURROUGHS, WELLCOME & CO

BOMBAY:
18th December 1923.

[NOTE.—These samples were made over to Dr. J. P. Bose, Diabetes Research Scholar, Calcutta School of Tropical Medicine, upon receipt for test. His report will be found upon page 132 of this issue.—EDITOR, *I. M. G.*]

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—We have pleasure in enclosing herewith copy of letter received this mail from The British Drug Houses, Ltd., London, giving further particulars as to the testing of insulin returned from India, and we trust that this will be found of sufficient interest to you to ensure its publication in your next issue.—Yours, etc.,

SMITH, STANISTREET & CO., LTD.

9, DALHOUSIE SQUARE,
CALCUTTA:
22nd January 1924.

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—Our Mr. Grimshaw has reported to us the tests of "A. B." insulin, Batch No. 243, which you carried out early in December. We greatly appreciate the trouble you have taken in testing it and your kindness in allowing Mr. Grimshaw to witness the test.

He has returned to us two bottles of this batch, and we have had the contents of one of the bottles re-tested, employing the half-empty bottle, as we consider that this would be the most stringent test possible.

We found that 0.25 c.c. (or 5 units) reduced the blood sugar of a 2-kilogramme rabbit from 0.1 to 0.043 per cent.; 0.5 c.c. (or 10 units) reduced the blood sugar from 0.11 to 0.041 per cent., giving severe convulsions; and 0.625 c.c. (or 13.5 units) reduced the blood sugar from 0.11 to 0.043 per cent., giving such very severe convulsions that the life of the rabbit was with difficulty saved.

This result corresponds so closely with our tests of this particular batch before it was issued that we are satisfied that there has not been the slightest loss of activity, in spite of the fact that the insulin was sent out without any precautions as to cold storage during its journey to and from India nor, so far as we know, whilst it was in India, therefore in some 2½ months of tropical conditions it has undergone no change.

We would point out that this batch was one of the last issued of the old standard of activity, and that the insulin issued by us since then has all been approximately 50 per cent. stronger than this.

We are greatly impressed with the fact which this and other reports from India seem to indicate, that the rabbit test carried out there does not compare directly with the rabbit test carried out in this country, and it would seem

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a possible explanation that there is some difference in the reaction of the rabbits due to different climatic conditions or to the character of the food given to them. It is conceivable that these differences cause the liver of the Indian rabbit to possess a greater store of glycogen. We presume that there is no reason to suppose the difference to be due to the strain or breed of rabbit.

Apart from the above, we have very carefully and repeatedly re-tested our "A.B." insulin after storage under different conditions, and have not so far been able to observe any detectable loss of activity after many months.

In view of the set-back which insulin treatment has suffered in India through the publication of adverse reports on the keeping properties of insulin solution, we trust that in the public interest you will see fit to give full publicity to the statement contained in this letter, in your valuable journal, so that the benefits of insulin treatment may not unnecessarily be withheld from those suffering from diabetes.—Yours, etc.

THE BRITISH DRUG HOUSES, LTD.

16-30, GRAHAM STREET,
CITY ROAD, LONDON, N.1.
3rd January 1924.

[NOTE.—The original No. 243 batch, which was kindly submitted to us by Mr. Grimshaw, was tested in his presence by Dr. J. P. Bose, Diabetes Research Scholar, Calcutta School of Tropical Medicine, whose report will be found on page 132 of this issue. The above letter is a reply to this report.

We have shewn the above letter to Dr. Bose, who remarks:—

(1) That it would appear from the letter that the maximum reduction of blood sugar came to much the same, viz., down to 0.041 to 0.043 per cent. whether 5, 10 or 13.5 units of insulin were used.

(2) It would further appear that the reduction of blood sugar did not vary very much in spite of the increase in dosage. The reduction with 10 units was apparently slightly greater than with 5 or with 13.5 units.

(3) Although the blood sugar percentage came down to what is generally considered as being below the "convulsion level" in all three rabbits, only two went into convulsions. The dose given to the second rabbit, 10 units, is approximately 3½ times what should be a fatal dose for the rabbit, and—although convulsions ensued—the reduction in blood sugar was 63 per cent. of the sugar content of the blood or just below the theoretical reduction of 70 per cent. for a convulsant dose.

It would appear that either (*a*) the rabbit test is unsuitable under Indian conditions; or (*b*) that there may be some factor present causing deterioration, and that—as will be seen from Dr. Bose's findings with insulin sent out in cold storage, on page 132 of this issue—such factor is not necessarily exposure to heat. The whole subject clearly requires further and thorough investigation. In the meantime, in view of the undoubted therapeutic success in clinical practice with insulin in India, and of the results recorded by Major Taylor with insulin sent out in cold storage, it would appear advisable at least to use only insulin which has been sent out in cold storage and kept in cold storage since arrival in India. The letters from the manufacturers are clearly justified in view of the extreme importance of the preparation in medical practice in India; and we would welcome any further and authoritative information on the subject.—EDITOR, *I. M. G.*]

THE INDIAN MEDICAL YEAR, 1923.
A CORRECTION.

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—*Re* your article in the January number of the *I. M. G.*, entitled "The Indian Medical Year, 1923" you made a kindly reference to my article regarding the influence of altitude in malaria. Unfortunately by a clerical error you have represented me as saying that in July and August the humidity (in Murree) is unfavourable whereas my whole point (as the chart and letter press clearly show) was that in these months and in these months alone the temperature *and* humidity are both favourable to transmission.

The error is obviously clerical and is readily understood in view of the wide range of reading which the preparation of your article entailed. If you could see your way to correct the mistake I should be obliged; for more people will read the *I. M. G.* than the original paper.—Yours, etc.,

C. A. GILL,
Lieut.-Colonel, I.M.S.

LAHORE, PUNJAB:
22nd January 1924.

A SENSITIZED ANTI-PLAGUE VACCINE.

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—With reference to my offer to supply sensitized anti-plague vaccine which appeared in the December issue of the *Indian Medical Gazette* I much regret I can no longer keep the offer open. I must apologise to those officers whose letters I have not yet had time to answer, and also to those whom I have kept waiting for the vaccine. I will supply all who have already applied to me as soon as I can, but I cannot undertake to send out any more after February 15th.—Yours, etc.,

C. J. STOCKER,
Major, I.M.S.

2, RESIDENCY ROAD,
PESHAWAR:
The 12th February 1924.

Service Notes.

OBITUARY.

THE LATE RAI BAHADUR HIRA LAL.

The death of the late Rai Bahadur Hira Lal on the 14th of October, 1923, removes one of the best known and brilliant of Indian surgeons in the Punjab. Born in 1873 at Amritsar, he qualified from the Lahore Medical College in 1891, and his subsequent career was closely bound up with that college. He held in turn the appointments of House Surgeon to the Mayo Hospital, Demonstrator in Anatomy, Lecturer in Medicine and Materia Medica and Lecturer in Surgery at the Medical College. Much of his genius for surgical work and professional ability was learnt under Colonel F. F. Perry, I.M.S., and he stood perhaps first among his compeers in the province in both general and ophthalmic surgery. During the war he acted as Honorary Surgeon to the Mayo Hospital, Lahore. As a surgeon he was accurate and bold, whilst he always upheld the dignity of his profession.

In addition to his professional duties, his interests covered a wide scope of useful service in connection with social welfare and the improvement of medical education in the Punjab. In 1922, during Sir Norman Walker's visit to India, he was associated with the enquiry into the midwifery teaching in the Indian medical schools, and was one of the pioneers for the scheme for establishing a fully equipped maternity hospital at Lahore for teaching purposes.

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A Rapid Restorative

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Bovril is a food as well as a stimulant. When taken regularly over measured periods, Bovril has been found to possess body-building powers of a very special and remarkable character.

Bovril

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PHYSIOLOGICAL REJUVENATION

"A MAN IS AS OLD AS HIS INTERNAL SECRETIONS."—*Lorand.*

For asthenia, debility, senescence, impotence, sterility and run-down conditions at varying ages, prescribe

TABS. GONAD CO. (Harrower)

It is a rational pluriglandular stimulant in hypocrinism, Reprint "The Hormones in Impotence" sent free on request.

The following is a complete list of all of the pluriglandular preparations of The Harrower Laboratory :

Packed in standard boxes of 100 Compressed, Friable Tablets in Air-tight Packing in Wax-sealed Strips (except Solutions Nos. 1a, 4a and 70a).

1—Adreno-Spermin Co. Asthenia, Suboxidation, Hypotension.	15/0
1a—Adreno-Spermin Co. (Solution) Boxes of 15 ampoules.	42/6
2—Antero-Pituitary Co. Defective Children, Mongolism, Epilepsy.	21/0
3—Placento-Mammary Co. Galactagogue Post-partum Involutant.	20/0
4—Thyro-Ovarian Co. Amenorrhea, Dysmenorrhea, Neurasthenia.	20/0
4a—Thyro-Ovarian Co. (Solution) Boxes of 15 ampoules.	42/6
5—Hepato-Splenic Co. Stasis, Toxemia, Hepato-biliary Insufficiency.	17/6
6—Pancreas Co. Hyperthyroidism Heart Hurry, etc.	17/6
8—Thyroid Co. (Desic. Gld.) (Gr. ¼) Hypothyroidism.	7/6
9—Thyroid Co. (Desic. Gld.) (Gr. ½) Same as No. 8.	7/6
10—Thyroid Test Capsules (3 tests) Differentiation of Thyroid Dis. (Goitre)	6/0
11—Calcium-Phosphorus Co. Remineralization in Acidosis, Toxemia.	7/6
12—Amylo-Trypsin Co. Indigestion, Flatulence, Gastric Insufficiency.	15/0
13—Hemoglobin Co. Anemia, Malnutrition, Chlorosis, etc.	17/6
15—Secretin Co. Indigestion, Pancreas and Biliary Insufficiency.	15/0
18—Iodized Thyroid Co. Simple Goitre, Hypothyroidism, etc.	17/6
22—Bile Salts Co. Bile Insuff. Mucous Colitis, Constipation.	15/0
23—Pancreatin-Bile Co. Intestinal Indigestion, Bliary Insufficiency.	17/6
24—Parathyroid Co. Paralysis Agitans. Hypoparathyroidism.	22/6
26—Adreno-Hypophysis Co. Asthma, Bronchial Asthma.	21/0
29—Thyro-Pancreas Co. w. Spermin Functional Hypertension in Men.	22/6
30—Thyro-Pancreas Co. w. Ovary Functional Hypertension in Women.	22/6
38—Mamma-Overy Co. Dysovarism, Long Menses, Menorrhagia.	21/0
40—Mamma-Pituitary Co. Menorrhagia, Metrorrhagia, Uterine Oozing.	24/0
41—Leydig Cell Co. Prostatic Hypertrophy, Senility, etc.	22/6
44—Pan-Secretin Co. Diabetes.	17/6
47—Pituitary Co. Hypopituitary, Infantilism, Hypogonadism.	22/6
48—Prostrate Co. Prostatic Disease, Neurasthenia, etc.	22/6
49—Placenta Co. Vomiting and Nausea of Pregnancy.	22/6
57—Thymus-Spermin Co. Arthritis Deformans, Rheumatism.	21/0
68—Spermin-Hemoglobin Co. Asthenic Anemia Suboxidation, Malnutrition.	17/6
70—Gonad Co. Impotence, Asexualism, Senility.	25/0
70a—Gonad-Co. (Solution) Boxes of 15 ampoules.	42/6
73—Gonad Ovarian Co. Sterility, Asexualism, Amenorrhea.	25/0
79—Adreno-Ovarian Co. Dysovarism (see No. 4) with Asthenia.	22/6
85—Renal Co. Nephritis, Albuminuria, Renal Insufficiency.	20/0

The prices stated are per box of 100 Tablets.
Obtainable from Chemists (on Prescription only) or direct from

ENDOCRINES LIMITED, Sole Distributors for The Harrower Laboratory
72, WIGMORE ST., LONDON, W.1.
Telegrams: "Endocrines," LONDON.

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Rai Bahadur Hira Lal will be missed by many friends and colleagues and by the numerous students whom he did so much to help. He leaves behind him six sons, the eldest of whom is Capt. S. L. Bhatia, M.C., I.M.S., Professor of Physiology and Hygiene at the Grant Medical College, Bombay.

APPOINTMENTS AND TRANSFERS.

LIEUT.-COL. J. K. S. FLEMING, O.B.E., I.M.S., Offg. Deputy Director-General, Indian Medical Service, is appointed to hold charge of the duties of Public Health Commissioner with the Government of India, in addition to his own, with effect from the 28th December 1923 and until further orders.

Lieut.-Colonel T. H. Symons, O.B.E., I.M.S., Offg. Surgeon-General with the Government of Madras, is confirmed in that appointment with effect from the afternoon of the 9th January 1924.

Lieut.-Colonel W. W. Jeudwine, C.M.G., M.D., I.M.S., Civil Surgeon, Simla, West, is appointed to hold charge of the duties of the Civil Surgeon, Simla, East, in addition to his own, during the absence on leave of Lieut.-Colonel F. W. Summer, M.D., F.R.C.S.E., I.M.S.

The services of Major T. D. Murison, I.M.S., are placed temporarily at the disposal of the Government of Assam, with effect from the 26th November 1923.

The services of the following officers of the Indian Medical Service are placed temporarily at the disposal of the Government of the Punjab from the dates on which they assume charge of their respective duties:—

Captain S. Gordon, M.C., I.M.S.
Captain H. Chand, M.C., I.M.S.
Captain N. D. Puri, M.B., I.M.S.

LEAVE.

LIEUT.-COLONEL F. H. G. HUTCHINSON, C.I.E., I.M.S., Public Health Commissioner with the Government of India, is granted leave for eight months with effect from the 28th December 1923.

Lieut.-Colonel E. E. Waters, I.M.S., Surgeon Superintendent, Presidency General Hospital, Calcutta, is allowed leave for twelve days, with effect from the 14th October 1923, in extension of the leave granted to him.

Lieut.-Colonel F. W. Summer, M.D., F.R.C.S.E., I.M.S., Civil Surgeon, Simla, East, is granted leave for four months with effect from the afternoon of the 25th October 1923.

Major J. Morison, I.M.S., Assistant Director, Bombay, Bacteriological Laboratory, is granted leave for 8 months with effect from the 15th April 1924 or the subsequent date on which he avails himself of it.

RETIREMENT.

COLONEL W. G. PRIDMORE, C.M.G., M.B., I.M.S.

RESIGNATION.

CAPT. B. F. BEATSON, I.M.S. 7th November, 1923.

PROMOTIONS.

Lieutenant-Colonel to be Colonel.

Archibald Nicol Fleming, D.S.O., M.B., F.R.C.S.E., *vice* Colonel Charles Harford Bowle-Evans, C.M.G., C.B.E., M.B., promoted to the rank of Major-General, with effect from the 6th September 1923. Colonel Fleming's tenure of appointment will reckon from the 3rd December 1923.

The promotion to his present rank of Major R. A. Chambers, O.B.E., M.D., notified in Army Department, Notification No. 2313, dated the 4th October 1918 is antedated from 1st September 1918 to 1st March 1918:

To be temporary Major.

Captain (now Major) G. R. Lynn, D.S.O., M.B., I.M.S., to be temporary Major whilst employed as Deputy Assistant Director of Medical Services with the Egyptian Expeditionary Force, from the 16th May 1918 to 30th July 1921.

To be temporary Captain.

Dwarka Prasad Bhargava. Dated 16th August 1923.

To be temporary Lieutenants.

Muneeb-ud-Din Minhas. Dated 29th November 1923.
Asa Nand Narang. Dated 1st December 1923.
Lachhman Das Khatri. Dated 7th December 1923.

A War Memorial for the Sub-Assistant Surgeons of the Madras Presidency who fell during the Great War has been subscribed for and an obelisk is nearing completion. The Memorial Committee has decided to carve on the obelisk the names of the Sub-Assistant Surgeons who died in the Great War. So far it has been possible to collect the names of the following Sub-Assistant Surgeons. Any additions or corrections regarding these names will be very thankfully received by the Committee. All communications should be addressed to the Honorary Secretary, War Memorial Committee, Royapuram Medical School, Madras.

1. R. Krishna Singh.
2. Farid Khan.
3. K. Sukumaran.
4. Capt. K. Harihara Bhat, I.M.S.
5. C. M. Tholasy.
6. H. Papanna Naidu.
7. V. Sambasiva Naicker.
8. M. Narayana Nair.
9. Shaick Shaick Farid.
10. Syed Sulaiman.
11. David Pillay.
12. Udankelu.
13. Narayanaswamy Swaminathan.
14. G. Appala Narasimhulu Naidu.
15. M. R. Timothy.
16. T. C. Ramaswamy Sarma.

Hon. Secretary,
War Memorial Committee,
Royapuram Medical School.

MADRAS:
2nd February, 1924.

NOTICES.

THE SUNIC X-RAY COMBINATION.

MESSRS. WATSON AND SONS, Sunic House, Parker Street, Kingsway, London, W.C.2, have recently issued their bulletin No. 565 dealing with this apparatus. It comprises the following instruments assembled into one unit:—

A horizontal couch on which screening is carried out and exposures made.

A vertical stand for the same purposes with the patient standing.

A high-tension transformer for directly operating the Radiator type of Coolidge *x*-ray tube.

The whole is so designed as to fit into a small space and be suitable for the consulting room, the actual floor space required being only 9 feet by 3 feet 6 inches.

The transformer has an output of 64,000 R. M. S. volts at 30 milliamperes continuously, and also provides, by means of a special winding, the low voltage current necessary for heating the cathodic spiral of the Coolidge tube. When the transformer is operated from alternating current mains the outfit is noiseless except for a faint hum. With direct current supplies a small rotatory converter is required. There is an entire absence of moving and fragile accessories and all high-tension wiring is insulated and protected. All parts are fitted.

The complete combination for alternating current is listed at £285, or for continuous current at £340. The

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brochure also contains a complete price list of accessories and photographic accessories.

THE HILGER INDUSTRIAL, MEDICAL AND STUDENTS' POLARIMETER.

MESSRS. ADAM HILGER, 75 (*a*) Camden Road, London, N.W.1, bring to our notice a new and useful polarimeter, specially designed for any class of work which does not demand a greater accuracy in angular rotation than 0.05 of a degree. When used for sugar estimations this corresponds with 0.035 grammes of sugar in 100 c.c. measured in a 2 decimetre tube. The scale is divided to read by vernier to 0.05 degree. The main aluminium body is extremely rigid and carries the analyser, polariser and reading glasses. The splash glasses are set well back and are mounted upon cylinders inserted in the side of the main body and easily removable, thus making renewal and cleaning very rapid operations. No window fittings project into the trough, so that the corrosion so likely to occur at such places is avoided.

THE MEDICAL "WHO'S WHO."

THE Grafton Publishing Co., Chichester House, Chancery Lane, London, W.C.2, have forwarded to us an advance notice of an interesting forthcoming publication with the above title. Originally begun in 1912 as a small volume of 300 pages, it grew to a substantial volume under its late editor; but publication was suspended on his death in 1918. The new edition aims at blending all the good features of the *Medical Directory* with those of the well-known "*Who's Who,*" and such a scheme should produce a very attractive and useful volume. The editor calls the attention of registered English medical practitioners residing in India to the importance to themselves of returning the forms which they will shortly receive in connection with this volume. Many officers of the I. M. S., he notes, have sent in no reply to previous circulars and have furnished no particulars.

The work is recognised by the General Medical Council, which has furnished considerable help in its preparation, and the cover of the volume will be, by permission of the Council, a replica of that of the *Medical Register.*

VALENTINE'S MEAT JUICE.

VALENTINE'S meat juice is so well known that but little, except appreciation, of it is needed in our columns. It has been a favourite form of nourishment for patients with medical practitioners of at least two generations. In chronic intestinal ailments it presents a most excellent form of nutrition: in simple exhaustion—especially if taken with hot water—it restores vitality and energy: in all wasting conditions, and especially in phthisis, it is of very considerable value. In the tropics, however, perhaps its chief value is in acute gastric and intestinal disorders: where, when given iced and cold, in teaspoonful doses, it is often about the only form of nourishment that the patient will tolerate. Its use in convalescence after acute febrile diseases also renders it a most valuable preparation to the medical practitioner in the tropics.

LEITZ MICROSCOPES.

WE have received with much pleasure from Messrs. Ogilvy and Co., 18, Bloomsbury Square, London, W.C.1, copies of two new Leitz catalogues, Nos. 47A and 47C. The former is a catalogue of microscopes and contains many most interesting models. Thus the well known Leitz D model, which is in every way suitable for ordinary bacteriological work, is listed (with mechanical stage) at £31-5-0; whilst the new and sumptuous AABM model, with interchangeable monocular and binocular tubes, and with four objectives is priced at £58. This new and very perfect model, which we have seen and used, represents the latest word in clear definition and comfort in working.

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Original Articles.

ON THE RESULTS OF ANTI-MALARIA MEASURES IN FIVE TOWNS IN THE UNITED PROVINCES.

By J. A. S. PHILLIPS, D.P.H.,
MAJOR, I.M.S.,
Assistant Director of Public Health (Malariology), United Provinces.

(*Continued from the I.M.G., May* 1924, *page* 228.)

III. KOSI.

IN the year 1910, Captain J. D. Graham, I.M.S., who was then employed as Special Malaria Officer, United Provinces, was deputed to visit and report upon the town of Kosi, to state how far its unhealthiness was due to malaria, and to make such recommendations as would tend to bring about an improvement in the health of its inhabitants.

His findings, summarised briefly, were as follows:—

(1) That from a study of the vital statistics of the town of Kosi it was clear that there was a steadily increasing mortality for which malaria was considerably responsible.

(2) That the infantile mortality was high.

(3) That the death rate exceeded the birth rate.

(4) That the spleen index amongst children was very high, i.e., 81.3 per cent.

(5) That the parasitic index, i.e., the percentage of blood films taken from unselected cases in which parasites were present, was 26 per cent.

(6) That malaria was worse on the periphery of the town than at its centre, and worst in the area immediately adjoining the canal.

(7) That the main breeding grounds of the carrier type of anopheline mosquitoes were—

(*a*) The Main Canal.

(*b*) Certain portions of the Ganda Nala and Petter Kund and disused and partially used wells.

Captain Graham's recommendations were as follows:—

(1) That the bottom of the canal between miles 54½ and 56 should be carefully levelled and sloped towards the centre, along which there should be a V or U-shaped cunette.

(2) That the banks should be kept free of grass during the rains.

(3) That the canal should be flushed once weekly during the rains when the water in the canal was cut off.

(4) That disused wells should be filled in and those partially used should be suitably screened.

(5) That the syphon which conveys the water in the Ganda Nala under the canal should be enlarged so as to obviate the blocking and consequent flooding of the adjacent land which occurs from the Ganda Nala during the rains.

(6) The filling up or draining of certain tanks or Kunds which were found to be breeding anopheline mosquitoes of the carrier type—as also of the borrow pits found to be breeding anopheline mosquitoes.

On the 11th May, 1912, a Committee met to consider the whole question and to devise ways and means for carrying out the recommendations made.

The Committees' recommendations, summarised briefly, are as follows:—

(1) That the canal bed for about 2½ miles in the immediate vicinity of Kosi (i.e., from mile 53½ to 56) should be made waterproof, and that the bottom of the canal for two miles should be cunetted.

(2) In addition the canal department should flush the canal at intervals of not more than eight days.

(3) That the proposed fall in the canal at mile 61 should be made at mile 54 furlong 4 instead, which would result in the lowering of the bed at this point by 2.25 feet. This would enable the main Kosi drain to enter the canal itself, the result being that the Kosi town area would be drained in a few hours.

(4) The realignment of the Kosi branch drain which disposes of the storm water in the surrounding country.

(5) All tanks and depressed areas to be filled up to a level at which they could be effectively drained.

(6) The Ganda Nala to be regraded, lined with masonry with a small cunette at its base.

(7) The railway authorities should be asked to fill up all existing borrow pits and excavations within their boundaries to a level at which they can be effectively drained for a distance of ½ mile north and south of the inhabited area.

(8) Disused wells should be filled and partially used ones should be suitably screened.

A grant of money was made by the Government of India to carry out these recommedations and the work was commenced. For various reasons and after much correspondence, recommendations Nos. 1, 2 and 3 were finally abandoned.

Items 4, 5 and 6 were reported as having been completed on 31st December, 1915, and Nos. 7 and 8—the latter only so far as the disused wells were concerned—were also carried out.

It will be seen, therefore, that the most important of the recommendations made were not carried out.

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Dealing now with the effects of the anti-malarial works carried out at Kosi:—

As the main breeding ground has received no treatment one would not expect to find any considerable improvement in the health of the town, and on an examination of the vital statistics for the decade 1913-1922 this would at first appear to be the case.

The population of the town has still further diminished; whereas at the census taken in 1911 the population was estimated to be 7,188, in 1921 it had fallen to 6,753.

For purposes of comparing the figures for the total mortality and total birth rate during this decade with those given by Captain Graham for the period 1880-1909, the following table has been prepared:—

TABLE I.

Decade.	Total mortality per mille.	Birth rate per mille.
1880—1889 ..	36·73	29·22
1890—1899 ..	50·62	42·58
1900—1909 ..	74·04	36·00
1913—1922 ..	56·52	51·89

It will be seen at a glance that there has been a considerable increase in the birth rate during the latter decade and this in itself points to a lessened malaria incidence, as it is a well known fact that malarial fever has an adverse effect on the birth rate.

The death rate is higher than in any of the other decades given in Table I, except that of 1900-1909. It might be argued that in this decade the death rate was put up by the ravages of plague—but against this in the decade 1913-1922 influenza was raging in India during the years 1917-1918 and 1919,—particularly 1918.

Table II is interesting as in it I have taken the average figures for nine years of the decade 1913-1922, and have also given the figures for 1918 (the bad influenza year) separately.

TABLE II.

Decade.	Total mortality per mille.	Birth rate per mille.
1880—1889	36·73	29·22
1890—1899	50·62	42·58
1900—1909	74·04	36·00
Average for 30 years.		
1880—1909	53·79	35·93
1913—1922	56·52	51·89
Average for 9 years.		
1913-1917 and 1919-1922	51·93	52·93
Figures for 1918 only ..	137·87	38·81

Several interesting facts will be noticed in the above table.

(*a*) That the birth rate during the nine years 1913-1917 and 1919-1922 actually exceeded the death rate by 1 per mille.

(*b*) That the death rate in 1918 was really 2½ times as great as in the average for the decade 1913-22 and more than 2½ times as great as the average for nine years of this decade excluding 1918.

(*c*) That the birth rate in 1918 was considerably lower than the average for the ten years 1913-1922.

The total number of births in 1918 was 279 and the total mortality reached the enormous figure of 991; i.e., the deaths exceeded the births by 712.

The average total number of deaths for nine years of the decade 1913-1922 (i.e., excluding 1918) was 415. This average figure is inclusive of deaths from influenza in 1917 when the total mortality was 578 and in 1919 when it was 530. Deducting this average figure from the total mortality figure for 1918, i.e., 991, it is found that there were in this year 576 more deaths than the average for the other nine years of the decade.

The drop in the population at the 1921 census of 435 is, therefore, readily explained by the enormously high mortality figure for 1918.

Turning next to evidence of endemic malaria, a marked improvement is at once noticed.

Spleen index.—In 1910 Captain Graham examined 964 children at Kosi and of this number 784 or 81.3 per cent. of them had enlarged spleens. In 1923 I examined 480 children of whom 204 or 42.5 per cent. had enlarged spleens. These figures are best compared in tabular form:—

Year.	Number of children examined.	Number with enlarged spleens.	Percentage with enlarged spleens.
1910	964	784	81·3
1923	480	204	42·5

A careful record was kept of the exact location from which the children I saw came so as to be able to compare the figures for the various areas into which Captain Graham had divided the town of Kosi with those obtained by him for these areas in 1910.

TABLE III.

Shows this comparison.

Areas.	Spleen rate in 1910.	Spleen rate in 1923.
A ..	88·1	46·5
B ..	83·9	38·6
C ..	90·9	50·7
D ..	82·09	52·4
E ..	78·5	39·3
F ..	82·4	37·2
G ..	77·6	37·0

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But in a town of the size of Kosi, which is about a mile long and half a mile broad, the division of it into areas is hardly of the same significance as it is in a larger town covering a longer and wider area.

Captain Graham was of the same opinion and writes:—"In a town so small as Kosi, however, I hardly think one is justified in putting much stress on the small differences of the individual areas, and I am rather of opinion that we have here a town where the incidence of infection is very generalized both amongst all social strata and in every mohalla."

Looked at either way, i.e., the figures for the town as a whole or separately for each area, the spleen index has diminished by approximatey 50 per cent.

Parasitic index.—Captain Graham in 1910 examined two series of blood films taken from unselected cases. In the first series he found parasites in 26 per cent. of the slides examined and in the second in 20 per cent. In 1923 blood films taken similarly from unselected cases showed parasites in only 6.5 per cent. of the slides examined.

In tabular form these facts are shown as under:—

Year.	Number of slides examined.	Percentage with parasites.
1910 1st series ..	100	26·0
1910 2nd series ..	87	20·0
1923	61	6·5

It will thus be seen that although the main breeding ground mentioned in Captain Graham's report has received no attention, the carrying out of the other measures he recommended has brought about a considerable improvement.

Is there not sufficient justification in the results already obtained for the reconsideration of the whole question as to the advisability of dealing with the canal bed as recommended by Captain Graham?

A great improvement has been brought about by what has already been done, but the spleen index is still enormously high and Kosi must still be regarded as a very malarious town.

IV. MEERUT.

In the year 1911 Major Graham, I.M.S., Special Malaria Officer, United Provinces, was deputed to investigate and report on the cause of the continued fall in the population of Meerut during the past 32 years, and how far this drop in the population was attributable to malaria.

As a result of his investigations he submitted a very complete and comprehensive report which, summarised very briefly, was as follows:—

(1) "The vital statistics of the city indicate a high death rate, which, though showing undoubted evidence of a high percentage of malaria in the first two decades, has in the last decade shown a comparative drop in the percentage of malaria. (This investigation covered the period 1878 to 1911.) In this decade, however, there has been a high mortality from plague which has been responsible for the continued diminution of the population.

(2) Epidemic malaria has appeared at wide intervals, but the mortality from it has not affected the city severely.

(3) Endemic malaria exists as proved by vital statistics, spleen census and endemic index, but cannot be said to have been severe within the past few years, and seems to be diminishing.

(4) The total spleen rate is 5.9 per cent., the lowest area being round the tahsil in the centre of the city.

(5) The parasitic index is 6 per cent. in a series of films taken in October 1911.

(6) The city shows a distinctly more severe infection on the east, south-east, and south aspects, than anywhere else.

(7) In close proximity to the area of severe infection are the principal carrier anopheline breeding grounds, i.e., the Abu Nala, Suraj Kund and Victoria Park pools."

Major Graham's recommendations, summarised briefly, are as under:—

(1) The Abu Nala is the most important breeding ground of carrier anophelines and therefore the one that requires primary consideration. The main reason why this nala becomes a breeding ground is because of the inadequate and irregular flushing it receives, and during August, September and October the flush is suspended altogether.

He recommended:—

(*a*) A twelve hour or even a six hour flush once weekly all the year round.

(*b*) The construction of a *pucca* cunette.

(2) The Suraj Kund is a large *pucca* stone tank whose west side is built over with temples. Much lotus and coarse vegetation is allowed to decay in it without any attempt at cleansing, the decaying matter gives shelter to mosquito larvæ. The tank should be cleared of all vegetation and no more aquatic plants should be introduced into it.

(3) Victoria Park tank should be filled to a level at which it could be drained into the Abu Nala.

(4) The filling, or draining, or both, of certain other proved breeding grounds of carrier anophelines.

Work on the lines laid down in these recommendations was started in 1915.

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The banks of the Abu Nala have been made *pucca* for a considerable length of its course.

The Suraj Kund was cleared of vegetation and when I saw it in August 1923, although there was a certain amount of aquatic plants in it, it was comparatively clear.

The Victoria Park tank has been partially filled—but still requires a little further filling to ensure of drainage into the Abu Nala. This, I was informed, is to be done shortly and funds are available for the purpose.

Several other breeding grounds have also been filled.

The effect of these measures on the health of the town.—The first point that strikes one's attention is that there has been an increase in the population of Meerut city; that, whereas the population at the census taken in 1911 was 76,351, in 1921 it was 77,711, and this in spite of the fact that in 1918, owing to the high mortality from influenza, the total number of deaths reported was almost double that of the average total mortality for the other nine years of this decade; i.e., the total number of deaths in 1918 was 5,576 but the average for the other nine years of the decade was only 2,978.

So that whereas in 1911 it was shown that the population of Meerut was diminishing and had been diminishing for over three decades, since that date it has increased.

The average birth rate per mille of the population in the decade 1913-1922 was 40.10, and the average death rate during the same period was 35.30. The birth rate, therefore, exceeded the death rate by 4.80 per mille per annum.

In tabular form and for purposes of ready comparison with the statistics given by Major Graham in his report in 1911 these facts will be readily appreciated in the following table:—

TABLE I.

Decade.	Total mortality per mille of population.	Birth rate per mille.
1878—87 ..	37·84	41·18
1888—97 ..	32·63	39·33
1898—07 ..	47·60	42·13
1908—11 ..	40·76 (average for period)	37·16 (average for period)
1913—22 ..	35·30	40·10

It will be seen at once that the death rate during the decade 1913-22 is lower than in any of the other periods shown above with the exception of the decade 1888-97. The latter decade was the only other one in which the birth rate exceeded the death rate.

How far this improvement in the health of Meerut City can be attributed to the anti-malarial works that have been carried there it would be difficult to say. But that these measures have brought about an improvement in the amount of endemic malaria, as evidenced by the number of children with enlarged spleens, the following facts will prove:—

In 1911 Major Graham examined 5,494 children of whom 325 or 5.9 per cent. of them had enlarged spleens. In 1923 I examined 3,126 children out of whom only 41 or 1.3 per cent. had enlarged spleens.

A careful record was kept of the locality from which the children examined came so as to be able to make a comparison of the figures obtained in 1923 with those recorded by Major Graham for the various areas into which he divided the city. The following table shows this comparison:—

Areas.	Percentage with enlarged spleens, 1911.	Percentage with enlarged spleens, 1923.
A	18·9	2·4
B	10·4	1·8
C	16·4	1·4
D	4·7	0·5
E	5·8	1·2
F	7·3	Nil.
G	4·4	0·9
H	4·0	1·5
K	2·5	1·3

Parasitic index.—Major Graham in 1911 examined blood films taken from unselected cases and found parasites in 6 per cent. of the slides examined. In 1923 slides similarly examined from unselected cases showed parasites in only 3 per cent. examined.

It will thus be seen that the anti-malarial measures carried out at Meerut have resulted in a considerable improvement in the health of the inhabitants as far as malaria is concerned, and since there has been a reduction in the total mortality in the town it is reasonable to assume that some portion of this improvement can be ascribed to the lessened incidence of malaria. Malaria in itself is not a very fatal disease, but by lowering the vitality of its victims it renders them less capable of withstanding the effects of other and more fatal maladies.

V. LUCKNOW.

In the report on civil hospitals and dispensaries for 1912 the town of Lucknow was described as "pre-eminently the most malaria-stricken town in the provinces," and as a result of these remarks Major Graham, who was then Special Malaria Officer of these provinces, was deputed to investigate and report on the town.

In a very detailed and comprehensive report of his investigations, which were begun early

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in the monsoon of 1913, Major Graham was able to prove that Lucknow could not be regarded as a malarious town. (1) He states "from all the evidence adduced the writer is of opinion that Lucknow is not at present a malarious city, and the original conclusions derived from the clinically recorded malarial figures would appear to be erroneous. Some of the other conclusions he arrived at and was able to prove were as under:—

(2) About 1|10th of the verified fever deaths (i.e., about 1|30th of the total mortality) were due to malaria. As a cause of mortality malaria has, therefore, affected the city very lightly.

(3) The spleen index of the city was 2.2 per cent. which is a very low figure.

(4) Malarial parasites were found in only 7.4 per cent. of 392 cases which had been diagnosed as malaria.

(5) Malaria was relatively more prevalent in the heavily populated wards along the river Gomti and in an area in the centre of the city near the water works.

(6) Many of the wells, spread over a large area of Lucknow, were found to be breeding *A. stephensi*, a proved carrier of malaria and the one responsible for most of the malaria in Bombay.

(7) *A. culicifacies* and *A. fuliginosus*, two more well known carriers, were found to be breeding near the river.

(8) That the Ghazi-Uddin Hyder Canal was also breeding mosquitoes in portions where the cunette had been badly damaged, resulting in pools and collections of water.

Major Graham's recommendations.

(1) He recommended that a campaign should be started against open and disused wells. Disused wells were to be filled and ones in use suitably screened or stocked with larvæ-eating fish.

(2) As regards the river Gomti and the breeding grounds near it, it was considered that the periodical opening of the sluice gate of the weir, when the latter was completed, would wash most of the larvæ in the river down-stream and would also result in the drying up of pools and collections of water caused by the banking up of water above the weir.

(3) The damaged cunette in the Ghazi-Uddin Hyder Canal should be repaired and the banks of the canal cleared of grass and vegetation.

The Sanitary Board considered and discussed Major Graham's report and on 4th May, 1916, recommended that the level of the water in the Gomti should be lowered at the weir by 3 feet once a week for 24 hours.

It was hoped that this would have the effect of washing larvæ down-stream, and drying up most of the breeding grounds along the river bank and in the backwater above the bund.

Large accumulations of water in backwaters that could not be drained should be treated by petrolage.

As many disused wells as possible were to be filled up. On 26th September, 1919, the Chairman of the Municipal Board reported that almost all the blind wells in the town had been filled up.

Many pools along the course of the Ghazi-Uddin Hyder Canal were filled up during 1917, 1918 and 1919 and others were oiled regularly.

Major Graham prepared a series of tables giving details of the vital statistics of the town from 1878 to 1912.

For purposes of comparison Dr. Dube, the Medical Officer of Health, very kindly supplied me with similar statistics from 1914 to 1922.

Table I gives the annual birth rate and death rate for this period:—

TABLE I.

Year.	Death rate.	Birth rate.
1914	38·16	41·16
1915	40·34	42·74
1916	34·78	40·99
1917	44·78	45·27
1918	73·90	38·35
1919	41·66	34·19
1920	40·80	38·75
1921	47·40	40·84
1922	39·28	44·49
Average for nine years	44·56	40·75

It will be seen at a glance that Lucknow did not escape the epidemic of influenza which in 1918 took its toll of the inhabitants of India.

Had it not been for this high death rate in 1918 the birth rate would have about balanced the death rate. The average figures for the eight years of this period (excluding 1918) are birth rate 41.05; death rate 40.90.

The high sickness incidence of 1918 as evidenced by the high death rate would appear to have had an adverse effect on the number of births in the year following, the birth rate in 1919 was only 34.19, the lowest on record for this period.

Thus is the statistician, who bases his forecasts on the law of averages, defeated. A severe epidemic one year will upset all his calculations.

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Table II is one of comparison with some of the figures given by Major Graham in his original report.

TABLE II.
Average Annual Statistics.

Cycle.	Average death rate.	Average birth rate.
1878—1887 (9 years)	43·98	38·27 (8 years only).
1888—1897 ..	45·68	39·15
1898—1907 ..	52·43	40·20
1908—1913 ..	47·60	38·08
1914—1922 ..	44·56	40·75
1914—1922 excluding 1918.	40·90	41·05

It will be noticed that in spite of the high mortality from influenza in 1918, the average death rate for the period 1914-1922 is lower than any of those given by Major Graham, except in the cycle 1878-1887, and that the birth rate for this period is higher than any of other cycles given in this table.

If the statistics for 1918 are excluded from those for this period, as has been done in the last line of the above table, the comparison is even more marked.

How far this improvement in the general health of Lucknow can be ascribed to measures taken principally to combat malaria it is difficult to say, as Major Graham proved conclusively that malarial fever was responsible for only a very small number of the deaths recorded annually.

But that these measures have brought about an improvement in the amount of endemic malaria, the following, facts based on a spleen census of children between 2 and 10 years of age, will prove:—

In 1913 Major Graham found 2.2 per cent. of the children he examined had enlarged spleens. In 1923 under precisely similar conditions and at the same period of the year I examined 4,034 children and only 66 or 1.6 per cent. of them showed enlargement of the spleen.

A careful record was kept of the wards from which the children came so as to be able to compare the figures obtained in 1923 with those Major Graham found in 1913 and Table III shows this comparison:—

TABLE III.
Spleen Index.

Wards.	Year 1913.	Year 1923.
Wazirganj	1·6	0·8
Ganeshganj	1·6	1·6
Hazratganj	1·9	1·5
Yahiaganj	2·3	1·1
Saadatganj	2·4	1·8
Daulatganj	2·5	2·5
Chowk	2·9	2·3
Husainganj	3·1	1·4

It will be seen at a glance that a considerable improvement in the spleen index has occurred in Ward Husainganj. There has been a drop of 1.7 per cent. in the number of children with enlarged spleens. This ward or portions of it, borders on the river, and it is obvious that the measures adopted to deal with the breeding grounds in the river and in its vicinity have been beneficial. Similarly there has been a reduction in the spleen index in the wards known as Wazirganj, Yahiaganj and Saadatganj; whilst Daulatganj, Ganeshganj, Hazratganj and the Chowk remain much as they were in 1913.

The reduction in the wards in which there has been an improvement is small, but when the spleen index in 1913 was found to be so low, it is gratifying to know that it is even still lower as a result of the anti-malarial measures carried out since that date.

Parasitic index.—In 1913 Major Graham examined 346 blood films taken from patients diagnosed to be suffering from malaria at the various dispensaries in Lucknow and 46 films taken from children found to be suffering from enlarged spleens. Of this number only 29 or 7.4 per cent. of them were found to contain malarial parasites.

In 1923, 341 blood slides from patients diagnosed to be suffering from malaria were examined and only 21 or 6.1 per cent. of them had parasites.

It will thus be seen that although in 1913 it was proved that there was very little evidence of malaria in Lucknow and that the town could not be regarded as being malarious, there is evidence to show that there has been a still further reduction in the amount of endemic malaria.

This reduction can only be explained as being the result of the anti-malarial measures carried out since 1913.

SOME FACTORS IN INDIVIDUAL SUSCEPTIBILITY.*

By HUGH W. ACTON,
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Professor of Pathology,
and
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MAJOR, I.M.S.,
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Introduction.

DURING the last two years, we have been investigating certain diseases, e.g., asthma (Acton and Chopra, 1923), urticaria, etc., in which are

* Being a paper read at a meeting of the Medical Section of the Asiatic Society of Bengal on the 12th of March, 1924.

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observed individual peculiarities, such as the susceptibility of one person to the emanations from animals, e.g., horses, cats, etc., of another to certain foods, and so on. This susceptibility may be inherited or acquired during the life of the patient, and may be defined as the peculiar response shown by certain individuals towards certain bases, which are incapable of producing symptoms in a normal individual. The problem before us is to solve what constitutes this individual peculiarity.

During our experiments on the causation of epidemic dropsy, we obtained certain bases from diseased rice, and for a long time we were extremely puzzled at the varying results which we got amongst our experimental animals. Thus at one time one animal would give a typical reaction from our point of view, whilst the next day another animal of the same species would show no such effects after injecting these rice bases. At first we were inclined to attribute these varying results to slight alterations in the chemical processes of extraction employed by our collegues in the chemical department. Finally we asked them to keep to one extraction process and not vary it in the least. In spite of this our results still varied, showing that we were dealing with some varying factor in our test animals. To settle this point, we tested these rice bases on two animals, and got diametrically opposite results. Thus one animal showed bronchial constriction, marked augmentation of the heart beat, and a considerable rise in limb volume; the other animal showed slight bronchial relaxation, a marked rise in blood pressure and no rise in limb volume. Before we could more fully investigate the relationship of these rice bases to epidemic dropsy it therefore became necessary for us to find out the factors concerned in these individual variations.

These poisonous bases may get into the blood stream in one of the three ways, i.e., by:—

(*i*) *Inhalation*, e.g., the hay or pollen fevers, and the asthmas of animal origin.

(*ii*) *Absorption*, usually from the alimentary canal, as in asthma, urticaria, and giant urticaria; more rarely from ulcerated surfaces, or mucous membranes, e.g., bronchial and intestinal asthma.

(*iii*) *Inoculation of foreign proteids*, e.g., serum sickness after the injection of horse serum and anaphylaxia.

The normal individual can deal with these poisons and so no symptoms are produced, but in certain individuals the same substances, whether inhaled, absorbed, or inoculated, produce sufficiently violent symptoms to cause disease. These abnormal reactions on the part of the individual are called in our ignorance of the phenomenon, idiosyncrasy, susceptibility or sensitiveness, and when the more complex proteids are concerned in its production are termed serum sickness and anaphylaxia. We have here a wide range of chemical substances commencing from the intolerance to small doses of drugs such as the iodides and bromides, quinine and the salicylates to intolerance to the more toxic drugs such as quinidine, pilocarpine and digitalis. Still more complicated are the protein bases derived from food, plants, and the toxins of bacteria producing such diseases as hay fever, asthma, and urticaria. Finally, the varying degrees of susceptibility produced by injecting foreign proteids, e.g., serum sickness after horse serum, or in sensitised persons, the graver cases of intense bronchial spasm, and œdema of the glottis, which sometimes ends in death are called anaphylaxia. In all these different conditions, observers are unanimous that there is a peculiar susceptibility present, but in the case of anaphylaxia some observers consider that a tissue enzyme is produced which is capable of splitting the proteins into toxic bases.

The treatment recommended for anaphylaxia is injections of adrenalin, with or without pituitrin, and clinically we find that this NH_2 base also acts as a charm in many cases of asthma and giant urticaria, if administered early in the attack. Now the pharmacological action of adrenalin at first sight appears to be very evanescent, and we may ask ourselves the pertinent question, "How does this drug really act?" The answer to this question we hope to explain later.

Susceptibility or idiosyncrasy, is a phenomenon which may be:—

(*i*) *Congenital*, i.e., an inherited gift of the species; thus man suffers from lathyrism, whilst cattle can eat *kesari dâl* (*L. sativa*) with impunity. The guinea-pig is the best animal in which to demonstrate anaphylactic shock, whilst man is the worst. Again, the particular species may be immune to a particular poison, e.g., man to emanations from domestic animals, yet here and there, there are individuals who inherit this disability from their parents and suffer from asthma from their early youth.

(*ii*) *Acquired*, i.e., individuals who have tolerated these bases all their lives, and then for some reason or other have suddenly developed a susceptibility towards them. In many cases, after leaving off the particular food or drug for some time, and then taking it again, a sensitiveness has been acquired during this period of rest. In others, the phenomenon can be traced to some defect of digestion, of liver function, or of the endocrine defence mechanism.

We can therefore study the phenomenon best from two different points of view by estimating:—

(*i*) *The degree of variation in different animals of a particular species.*

(*ii*) *The degree of variation in different species*, which correspond respectively to the acquired and congenital susceptibility.

Before proceeding any further we would like to express our thanks to Captain De, Assistant Professor of Pharmacology, and Mr. N. R. Chatterjee, M.Sc., for their loyal help and co-operation during this long series of tedious experiments, when at times the problem seemed incapable of solution.

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The Endocrine Defence Mechanism.

For over a year these experiments were conducted on a large scale, and the animals we used were cats. These animals varied in weight from 2,200 grammes to 2,600 grammes, and the blood pressure and respirations were always recorded, and also—depending on the point which we were investigating—the limb, spleen, or intestinal volume. The drugs chosen were (I) Tyramine, an amine obtained from ergot, in doses of 1 milligramme per kilo of body weight. (II) Pilocarpine, the plant alkaloid obtained from the leaves of *Pilocarpus microphyllus*, in doses of 2 milligrammes per kilo of body weight. (III) Adrenalin, in 0.1 **c.c.** doses of a 1 in 1,000 solution of the hydrochloride. The injections were made into the saphenous vein. Tyramine acts through the sympathetic and causes a rise of blood pressure by vaso-constriction, and relaxation of the bronchiole muscles. Pilocarpine through the vagus causes a great fall of blood pressure due to vaso-dilation, and stimulation of the bronchiole muscles. Adrenalin acts through the myo-neural junctions of the sympathetic, and causes a rise of blood pressure due to vaso-constriction, and a relaxation of the bronchiole muscle. We used adrenalin in the same way as Dale used histamine, as a standard test by which we could make comparisons. This point will be more fully described later on in the paper. In general terms we noted that if the adrenalin reaction was poor, these bases usually acted on the involuntary muscles of the blood vessels and bronchioles; whilst conversely, if the adrenalin reaction was marked, the bases did not produce their characteristic effects in these animals. It was obvious from these results that the endocrine secretions were closely concerned in the defence of the tissues against the action of these bases.

We next determined to study the secretions of those organs, that were concerned with the control of the sympathetic nervous system and plain muscle,—i.e., the thyroid, the suprarenals, and the pituitary gland,—as many of these protein bases act through the sympathetic.

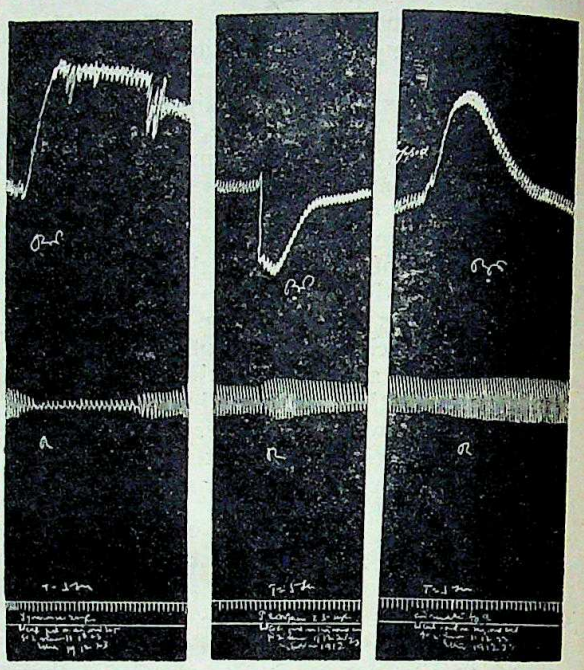
The Thyroid Gland.

The action of this gland was first studied, because it is the most important of these three glands, and as Leonard Williams rightly maintains it is the conductor of the endocrine orchestra.

(*A*) *The action of these bases in the presence of an excess of thyroxin in the tissues.* The animals were fed for a week on fairly large doses of thyroideum siccum and then tested with the following bases (*see* Graph I).

Tyramine caused a sudden rise of blood pressure, which was sustained, but the amplitude was not much increased, the reaction resembling that produced by adrenalin. The bronchiole relaxation was slight and not sustained for long. With the spleen volume there was a marked and persistent fall. Pilocarpine caused a sudden fall in blood pressure, with an acceleration of the heart beat, but a decrease in amplitude; the blood pressure did not rise higher than the normal on recovery and the bronchiole muscles

GRAPH I.—HYPERTHYROID.



Tyramine. Pilocarpine. Adrenalin.

were slightly constricted. Adrenalin hydrochloride caused a moderate rise in blood pressure with an acceleration of the heart beat; there was no relaxation of the bronchiole muscle. *Excess of thyroxin in the tissues therefore increases the action of these bases in their effects on the involuntary muscles of the arterial system by vaso-constriction, or vaso-dilatation, and under these circumstances they have little action on the bronchiole muscles.* Adrenalin and tyramine would therefore be of but little use in the treatment of acute attacks of asthma in hyperthyroid individuals.

(B) *The action of these bases in the absence of thyroxin in the tissues (hypothyroidism).* In these animals the thyroids were excised, and seven days after ablation they were tested with the three bases mentioned above. This interval of time was sufficient for all the thyroxin to have been utilised, and if all the parathyroids were not excised as well the animals survived, otherwise they died before the seventh day. These animals showed a delay in the healing of their wounds and were very prone to bacterial infections. The test drugs now gave a totally different picture to those we had already obtained in animals fed on thyroid (cf. Graphs I and II). Tyramine now caused a marked and persistent rise of blood pressure, with an increase in the amplitude of the heart beat. The relaxation of

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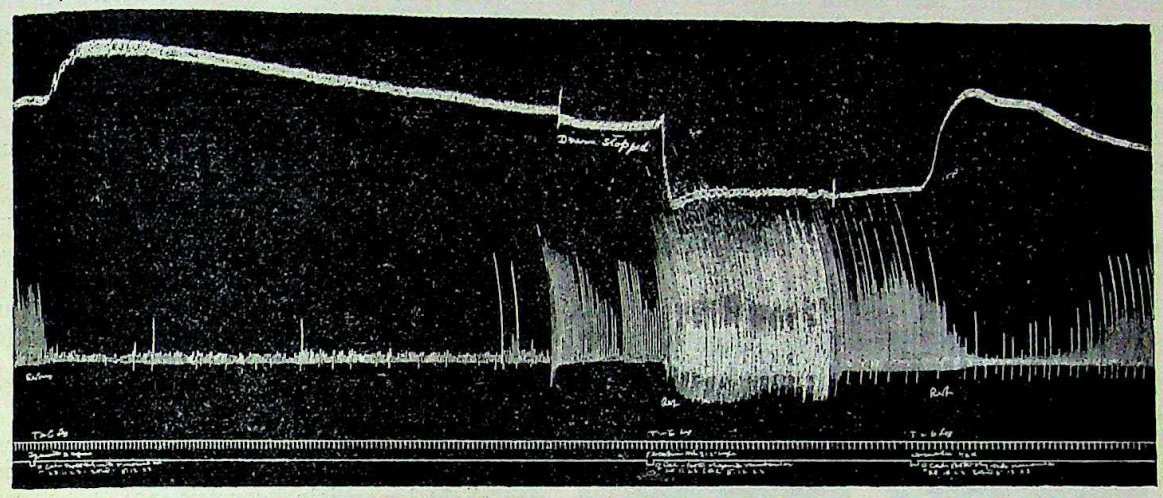
the bronchiole muscle was very marked and persisted for a long time. There was a marked fall of the spleen volume owing to constriction of the involuntary muscle in the spleen. Pilocarpine also caused a marked and persistent fall in the blood pressure, with a slight increase in the amplitude of the beats. Respiration was markedly accelerated and there was bronchiole constriction. There was also a marked fall in the spleen volume. With atropine, the relaxation of the bronchiole muscle was more marked in these animals. Adrenalin caused a marked rise in the blood pressure but there was no increase in the amplitude. There was marked relaxation of the bronchiole muscle but nothing like that produced by tyramine in these animals. The spleen volume showed a slight fall.

In short, the absence of thyroxin from the tissues showed the following effects in these animals. (I) *The involuntary muscles of the bronchioles react very violently to these bases, and tyramine becomes more powerful in its relaxor effect than adrenalin.* (II) *The effects on the blood pressure are less marked but more persistent; this applies as well to adrenalin, indicating that these animals have an excess of adrenalin (hyperadrenia).* (III) *In the absence of the thyroid which is the main stimulator of the sym-*

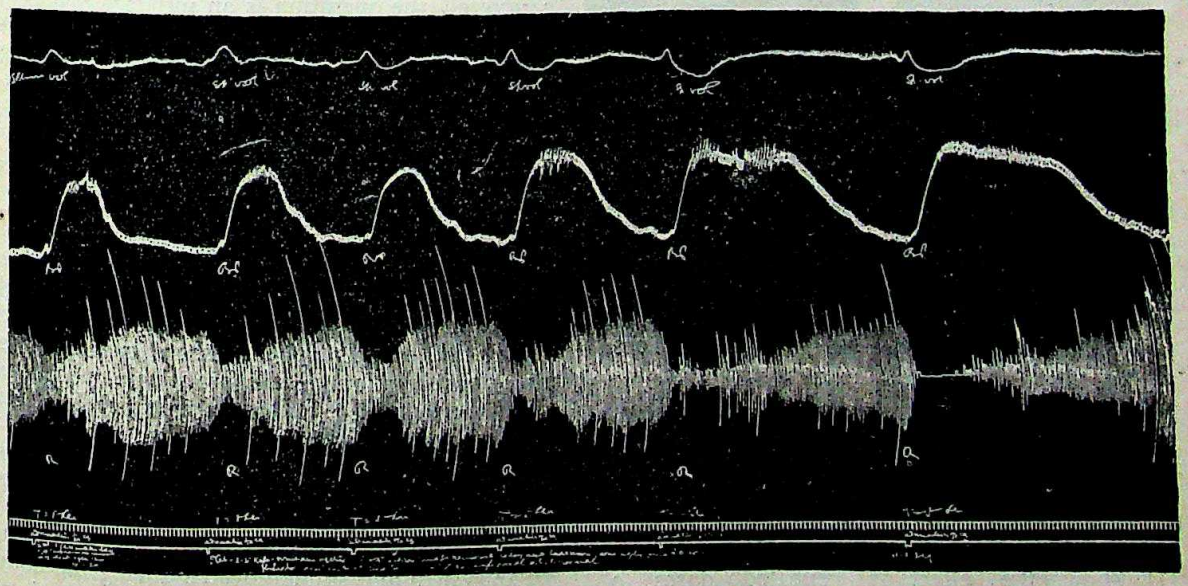
GRAPH II.—HYPOTHYROIDISM.



Tyramine. Pilocarpine. Adrenalin.

GRAPH III.

Effect of repeated doses of Adrenalin.



Adrenalin. Adrenalin. Adrenalin. Adrenalin. Adrenalin. Adrenalin.

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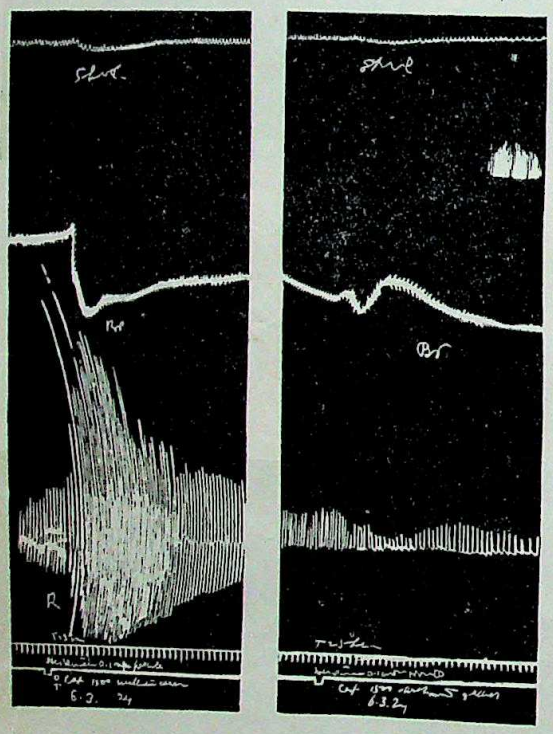
and the animal would be in a state of vagotonia, and such drugs as pilocarpine would cause violent reactions in these animals.

The Adrenals.

At first we thought that the major share in this endocrine defence mechanism was taken by the adrenals, because animals that reacted violently to adrenalin, usually gave a poor response to the other two bases. We shall see, however, that adrenalin—although important to counteract the effects produced by these bases—plays a rôle secondary to that of the thyroid in this phenomenon of sensitiveness.

(A) *The effect of an excessive amount of adrenalin in the tissues.* As feeding animals with

GRAPH IV.



Histamine before. Histamine after Adrenalin.
5 Repeated doses of Adrenalin of 0·1 c.c. of 1—1,000.

suprarenalin by the mouth was likely to be somewhat uncertain, we determined to give normal animals successive doses of adrenalin hydrochloride, 0.1 c.c. of a 1 in 1,000 solution. After 5 to 6 doses, the adrenalin response was very high, and we then tested the other two bases. Graph III shows the effect of repeated doses of adrenalin.

There is a steady increase in the rise of blood pressure with each successive dose, and the irregularities in amplitude become less and less. The relaxation of bronchiole muscle becomes more complete and more persistent. The fall in spleen volume becomes more and more marked. We may therefore conclude that a marked rise of blood pressure without irregularities in the amplitude, with marked and persistent bronchiole relaxation and fall in spleen volume are indicative of an excess of adrenalin in the tissues. In such animals when tyramine was next injected, it produced no rise in blood pressure or bronchial relaxation, and practically no fall in the spleen volume. In other words *an excess of adrenalin in the tissues markedly inhibits the action of these bases.*

It is probable that much of the relief that is given by this drug during the acute attack of asthma is due to this inhibitory effect of adrenalin, as bronchial relaxation lasts only for a short time in experimental animals, compared with the longer inhibitory effect seen clinically. Another effect that was noted after repeated doses of adrenalin was a reversed effect in the action of some of these bases (cf. Graph IV). Thus histamine in a normal animal causes a fall of blood pressure, bronchial constriction and a fall of spleen volume. After adrenalin in repeated doses, histamine only causes a very slight fall of blood pressure followed by a slight rise, bronchiole relaxation is often seen, and in one case very slight bronchiole constriction, which was much less than that in the original test. The spleen volume is still diminished. Similarly, pilocarpine causes an almost negligible fall of blood pressure followed by a slight rise, the bronchiole muscle tends to relax, and there is not much effect on the spleen volume.

(B) *The absence of adrenalin from the tissues.* The adrenalin glands were removed by operation. Here considerable technical difficulties were encountered, the operation is an intricate one transperitoneally or by the retro-peritoneal route, and sudden deaths are very apt to occur during the tests. The easiest way to avoid this danger was to first remove the adrenals, and then wait for two hours in order to allow all the adrenalin to be utilised by the tissues. These bases were then tested on several animals (cf. Graph V).

Adrenalin caused a comparatively poor rise in blood pressure, a slight increase in the amplitude of the heart beat and the heart's action was accelerated, secondary waves were observed on the initial rise of the blood pressure curve. There was no relaxation of the bronchiole muscle, instead there was a tendency to contraction. There was a slight fall of spleen volume. In short, in the absence of adrenalin, there was a poor response to this base both by the arterial and bronchiole muscle. These animals suffered from a loss of tone of the whole of the involuntary muscular system and sudden deaths during the course of our tests were observed amongst such animals. Tyramine caused a marked rise of blood pressure and a marked increase in amplitude with slowing of the heart beat. The relaxation of the bronchiole muscles was marked and fairly sustained, there was a fall of the spleen volume. *pathetic, the para-sympathetic would then control,*

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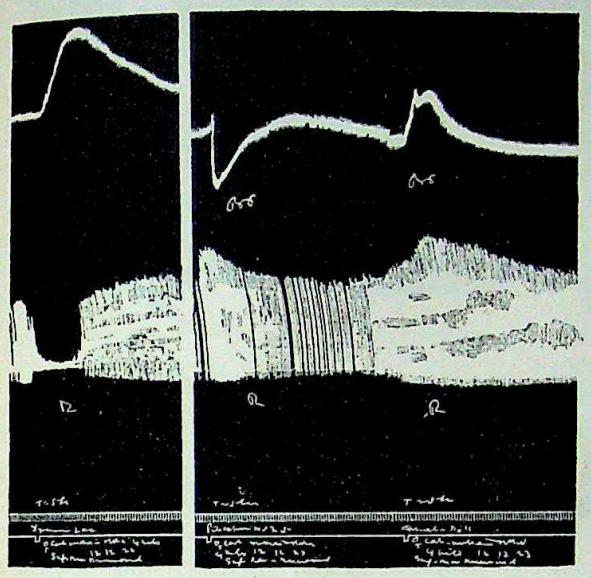
Pilocarpine caused a marked fall of blood pressure, with a recovery to a normal pressure in a short time; the amplitude of the heart beat was slightly increased. There was a very slight initial

GRAPH V.—HYPOADRENIA.



Tyramine 2 mgms. Pilocarpine 2·5 mgns.
Adrenalin 0·1c.c. 1—1,000.

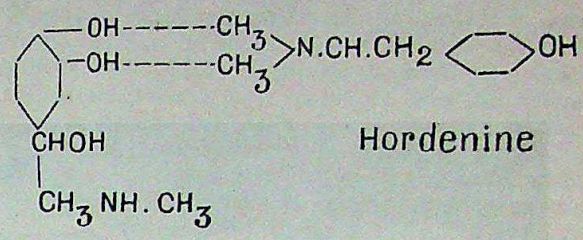
stimulation of the bronchiole muscle, followed by relaxation and slowing of respiration. There was a marked fall of spleen volume.

We are now in a better position to realise the antagonism exerted by adrenalin towards these bases. Swale Vincent (1922) first showed that adrenalin hindered the action of many drugs such as strychnine, aconitine and atropine, whilst more recently Harry (1923) has shown that tobacco amblyopia is rapidly cured by administration of adrenalin. Again, Kellaway (1923) has observed the fact that animals in whom the adrenal medullary substance has been destroyed by radium emanations, were susceptible to histamine, and that this effect could be antagonised by injections of adrenalin.

In our own experience we have found that the toxins that cause urticaria, and Quincke's œdema can sometimes be controlled by repeated small doses of adrenalin.

This antagonism has been considered to be of two kinds:—

(*A*) *Direct antagonism,* where a definite chemical union takes place between two substances to form a still larger non-diffusible, non-toxic molecule. Thus it has been suggested by others that the antagonism between hordenine and adrenalin which we showed—(Acton and Chopra 1923)—was due to a chemical union between the two—CH_3, groups in hordenine and the two—OH groups in adrenalin, producing a large and stable molecule, as follows:—



But this could not be so, for we found that 0.15 mgms. of adrenalin could antagonise 2.5 mgms. of hordenine, and the adrenal effect was still seen.

(*B*) *Indirect antagonism, or pharmacological antagonism,* where one base paralyses or occupies the terminal nerve endings and so prevents the action of the other base. Thus atropine paralyses the nerve terminals of the vagus and inhibits the action of pilocarpine; whilst ergotoxin paralyses the myo-neural junctions of the sympathetic and prevents the action of adrenalin, tyramine and histamine. Adrenalin probably behaves somewhat similarly when present in excessive amounts in the tissues, as it stimulates the myo-neural junctions of the involuntary muscles, and inhibits the action of tyramine and histamine. There is one aspect of this question of antagonism that has been neglected by most workers, and that is the antagonism exerted by the so-called vitamines towards poisonous bases in the food. Sajous (1921) was the first to hint at the possibility of this effect. We hope to show in a subsequent paper, that the bases obtained from rice polishings exert an effect on the tissues opposite to the effects obtained with the bases from diseased rice which is stated to have caused epidemic dropsy:—viz., bronchial relaxation, a fall in the limb volume, a slightly depressant action on the blood pressure, and diminution of the amplitude of the heart beat.

Pituitrin.

In the present stage of our knowledge of the secretions from this gland, only one type of experiments could be carried out by us, and consequently we lay little stress on the results. Graph VI shows these results.

In this experiment tyramine was first injected and the animal gave a very poor response to this base; then ¼ c.c. of pituitrin (commercial posterior lobe extract) was injected, and this markedly increased the tone of the intestinal muscle and amplitude of the heart beat. Tyramine was again tested with practically no effect on blood pressure or respiration. Adrenalin caused a marked rise in blood pressure, bronchial relaxation, and marked contraction and inhibition of intestinal movements, showing that such an animal had an excess of adrenalin sufficient to control the action of tyramine.

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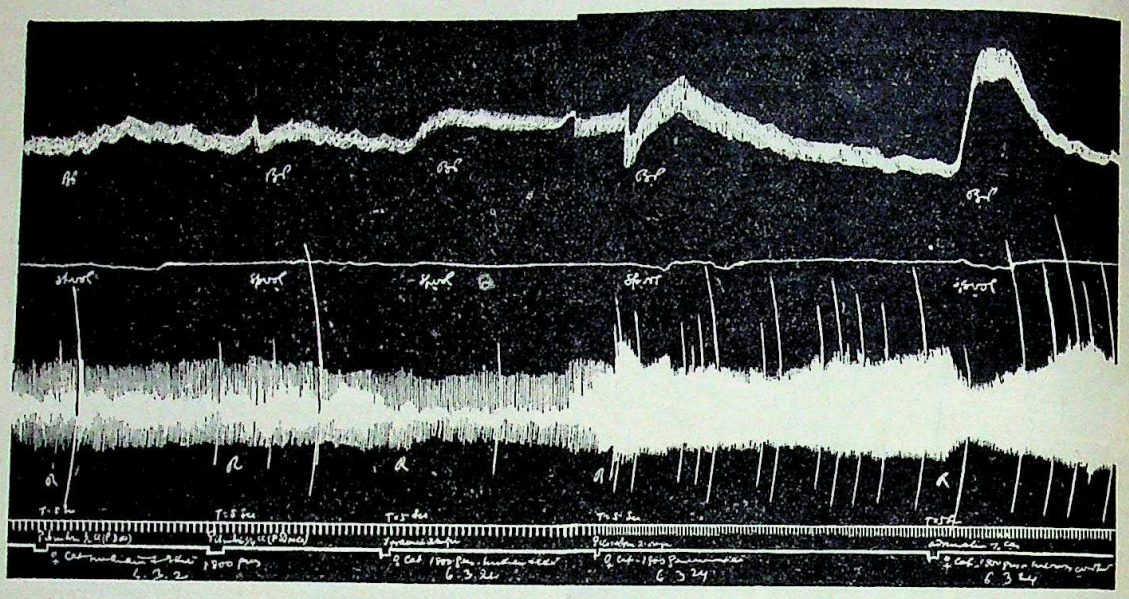
Pituitrin therefore appears to increase muscular tone, steadies the amplitude of the heart beat after adrenalin, and increases the action of pilocarpine.

GRAPH VI.



Pituitrin ¼ C.C. Pituitrin. Tyramine. Pilocarpine. Adrenalin.

Summarising these results, we may state that these endocrine secretions are stimulators of the sympathetic nervous system.

One of the secretions of the pituitary gland is concerned with increasing the tone of the involuntary muscles of the body. Dixon (1923) showed that the output from this gland was rhythmic, as it was increased by the secretion from the duodenum, and by the ovarian hormones.

Adrenalin acts on the myo-neural junctions of the sympathetic nervous system increasing both nerve and muscle tone, its output is capable of being suddenly increased by various factors, e.g., fright, whilst it is soon destroyed or utilised by the tissues of the body. It is the mechanism by which sudden falls of blood pressure can be most easily compensated in health, whilst the sudden and often fatal falls of blood pressure that occur during operations, and anaphylaxia are sometimes averted by this base. An excess of adrenalin in the tissues (hyperadrenia) acts on the myo-neural junctions diminishing cell permeability and so inhibiting the action of many of these bases. An absence of adrenalin in the tissues (hypo-adrenia) deprives the body of this rapid defence mechanism. In the absence of adrenalin, as the defence mechanism of the sympathetic nervous system is now wholly regulated by the thyroid secretion, which is much slower in action than adrenalin, sudden deaths during operations etc., are commonly seen amongst these animals.

The thyroid gland largely controls the secretion of adrenalin from the adrenal gland, thus in hyperthyroidism (Grave's disease) there is usually an excess of adrenalin in the tissues, e.g., Götsch test. Again in myxœdema, the amount of adrenalin in the tissues is also deficient. The secretion of adrenalin can, however, be in excess or diminished independently of the thyroid control.

The defence mechanism against drugs ingested by the mouth.

We cannot consider all the chemical changes that may take place in the alimentary canal in detail, but will only consider two of them which we have specially studied during the course of this research.

(*A*) *The effect of the hydrogen ion concentration.* In a paper now in press "On the Vital Processes at Cell Surfaces," Acton has shown that the main effects which change in the hydrogen ion concentration has on the cell surface are (1) to alter the electrical conductivity, and (2) to alter the cell permeability. Osterhaut (1923) showed that in an excess of —H ions, the electrical resistance was increased and the cell permeability diminished; whilst when an excess of—OH ions was present, the electrical resistance was diminished and the cell permeability increased, in fact resistance and permeability were closely correlated with each other. We regard the chemical crystalloids with which we are dealing, as consisting of three classes. (I) Inorganic salts, which are active by virtue of their free ions, viz., electrolytes. (II) Organic bases, which depend largely on their rate of diffusion for their activity. (III) Ampholytes, which act either as bases or as acids and function best at their optimum pH.

In the stomach, where the pH is about 1.2 at the height of digestion and there is therefore an

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excess of —H ions, we should find that the electrical conductivity is increased and the permeability is diminished, and the different effects will be shown by these crystalloids as follows. With inorganic salts, there will be a greater degree of ionisation, so that the salts of such metals as Hg., As., and Sb. will irritate and damage the mucous membrane if given in sufficiently large doses. With organic bases such as for example quinine, although introduced into the stomach as a soluble diffusible chloride, if the quinine remains in the stomach, owing to the diminishing permeability of the gastric mucosa, very little quinine will be absorbed and reach the circulating blood. With ampholytes, the best and most striking example is botulin-toxin, where the action is enhanced from a minimum lethal dose of $0\text{-}3^{-6}$ c.c. to one of 0.3^{-23} c.c.

Osterhaut (1923) has more recently shown that an excess of—OH ions increases the rate of diffusion of certain chemical compounds through cell membranes. We have been studying this point more closely and find that large doses of alkalies do not materially alter the pH of the blood. On the other hand, the amount of quinine present in the blood is increased nearly three fold when its oral administration is preceded by large doses of alkalies by the mouth, or when it is injected directly into the ileum as a base. In such an alkaline substrate most of the inorganic salts would be relatively inert, and the ampholytes would only act as weak bases.

Osterhaut has shown that there are certain organic substances such as bile salts which diminish cell permeability, and this function of the bile salts is important in the case of the more soluble diffusible peptones and polypeptids, as this gives time to the erepsin of the intestinal mucous membrane to split them further into simpler harmless amino-acids or bases. It is probable that the bases (vitamines) obtained from rice polishings act in a similar way by diminishing cell permeability and preventing the bases from diseased rice entering the circulation. If any toxic bases leave the intestine to circulate in the blood they must pass through the liver before they arrive in the general circulation.

(*B*) *The defence mechanism of the liver.* This mechanism may operate in one of the following ways. Recently we have been working with Dr. Sudamoy Ghosh, D.Sc., on the hydrogen ion concentration of the different organs of the body, and this work will be published independently. We found that the liver was the most acid organ in the body with a pH varying between 6.2 and 6.8, depending on whether we were dealing with carnivorous or herbivorous animals. Theoretically under these conditions we would expect the various inorganic salts of As., Sb., Hg., etc., to ionise and be deposited in the liver tissue, and this actually does occur, for we know that in cases of poisoning these metals are found in the greatest concentration in the body in this organ. In such an acid substrate many of the amines, betaines and alkaloids would appear to be relatively inert, as many of them act better in a pH between 7.2 and 8. In the liver there are certain ferments, oxidases, etc., which are capable of breaking down these poisonous bases into simpler and less toxic decomposition products. Ramsden and Lipkin (1918) considered that quinine was altered in this way into quitenene, a relative inert compound. Lastly we have the so-called adsorptive power, when simpler compounds are loosely bound physically to a complex protein molecule rendering inert such a poison, as only small quantities are liberated from time to time. A good example of this is carbon tetrachloride, where four times the quantity is required to produce a lethal effect when injected through the mesenteric vein as when injected through the jugular. Again, it has been found that carbon tetrachloride is more powerful when injected through a liver damaged with alcohol than when it passes through a normal liver (Chopra and McVail, 1923). These two factors, the pH of the intestinal tract and the defence mechanism of the liver, are of immense importance when poisons are ingested by the mouth or absorbed from the intestines.

We have therefore to consider three variable factors when drugs or poisons are taken by the mouth

(*I*) *The hydrogen ion concentration.*
(*II*) *The defence mechanism of the liver.*
(*III*) *The endocrine defence mechanism.*

and we are now in a better position to understand species and individual variations, which are usually spoken of as idiosyncrasy, susceptibility, etc.

Variations in the individual.

The animals tested were chiefly cats. In these animals adrenalin gave three types of curves. (I) A slight rise in the blood pressure with slight bronchial relaxation. (II) A moderate rise in blood pressure, which tended to persist longer than (I), whilst the amplitude became very irregular; in these animals there was moderate bronchial relaxation. (III) More rarely, there was a high rise in blood pressure with no tendency for the heart to become irregular in action, and with marked bronchial relaxation. From the previous experiments with repeated doses of adrenalin (cf. Graph III) it would appear that the cats with a small amount of adrenalin in their tissues would give a poor response to this drug (class 1); and animals with a large amount present in the tissues would give a marked response (class 3). On testing pilocarpine on these animals we got two types of response; (*a*) a fall of blood pressure which was not recovered from, with marked bronchial stimulation; or (*b*) a transient fall of blood pressure which was soon recovered from, and followed by a rise, with but only slight bronchial stimulation. Again from our experiments on thyroid-fed animals and thyroidectomised animals, we would say that the former animals (*a*) were hypo-thyroids whilst the latter animals

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(*b*) were hyper-thyroids. Tyramine when tested on animals usually very closely followed the adrenalin reaction; thus when the adrenalin response was poor, tyramine caused a marked rise of blood pressure and bronchial relaxation; whilst when the adrenalin reaction was marked, tyramine had little effect in raising the blood pressure or relaxing bronchiole muscles. We therefore see that the action of these bases in different individuals of the same species is largly controlled by the secretions from the thyroid and adrenal glands.

Variations in the different species.

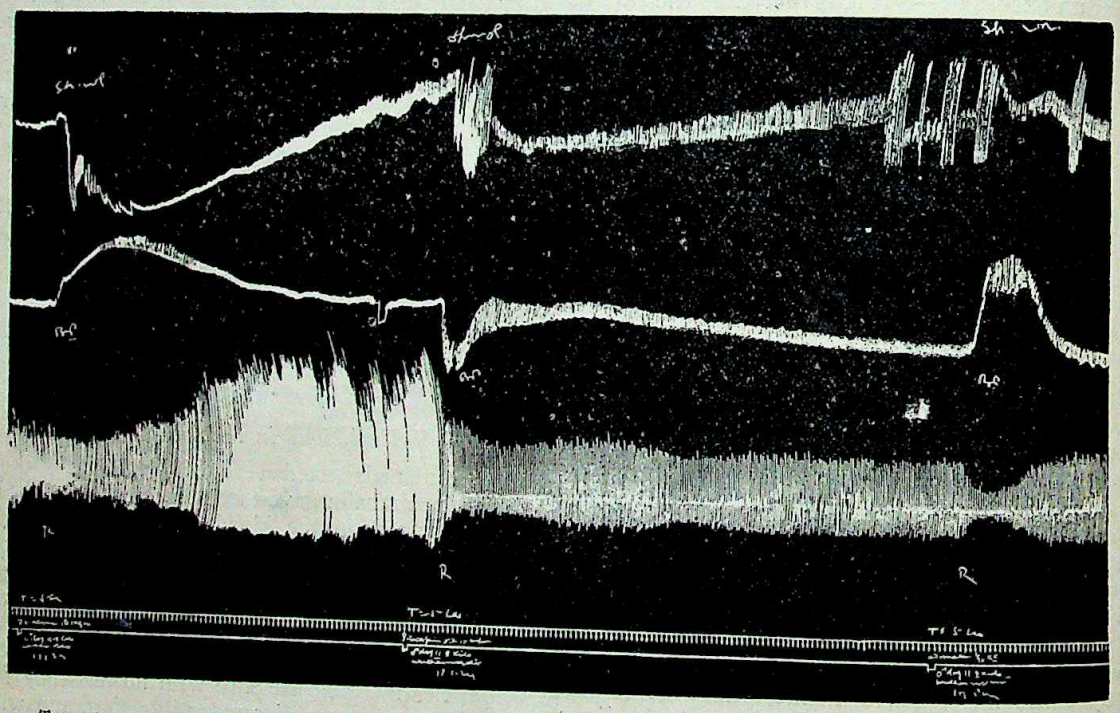
(*A*) *Dog.*—In this animal the adrenalin response is nearly always poor (Graph VII) or sometimes moderate (Graph VIII).

nalin response, which suggests that their adrenalin content is low; whilst the marked effect which these bases have on the circulation in dogs and the slight effect on respiration suggest that they are hyper-thyroids.

(*B*) *Monkey*—(Graph IX) In this animal adrenalin causes a marked rise of blood pressure and a marked increase in the amplitude; there is slight relaxation of the bronchiole muscles, and the movements of the intestinal muscles are decreased. Tyramine causes a very slight rise in blood pressure and slowing of the heart beat; the effect on respiration is very slight indeed, as well as on the intestinal volume. Pilocarpine causes a slight fall in blood pressure followed by a rise, and the amplitude of the heart is slightly increased; there is *distinct bronchial relaxation* and the intestinal

DOG—VARIATION IN SPECIES.

GRAPH VII.



Tyramine. Pilocarpine. Adrenalin.

As soon as the blood pressure rises to its maximum, the heart beat shows a marked slowing and an increase in the amplitude; bronchial relaxation is moderate, and there is a slight fall in spleen volume. Tyramine causes a marked fall in spleen volume, a moderate and prolonged rise of blood pressure with an increase in the amplitude and slowing of the heart beat; the relaxation of the bronchiole muscle is slight. Pilocarpine on the other hand causes the blood pressure to fall slightly, followed by a rise; the amplitude is increased and there is marked slowing of the heart beat; there is slight stimulation of respiration with slowing of the rate, the spleen volume shows a marked fall. Dogs in general give a poor adre-

movements are very markedly increased. Here we have a species of animal with a moderately high adrenalin content in the blood, which gives us this *reversed* phenomenon of bronchial relaxation with pilocarpine. The rise in blood pressure after pilocarpine suggests that the thyroid secretions are slightly abnormal in amount.

(*C*) *Rabbit.*—(Graph X). In these animals adrenalin causes a very marked rise of blood pressure, but no marked increase in the amplitude of the heart beat, there is marked bronchiole relaxation present, and the intestinal movements are almost stopped for the time being. Tyramine has no effect on respiratory movements, there is a very slight tendency for the blood pressure to rise,

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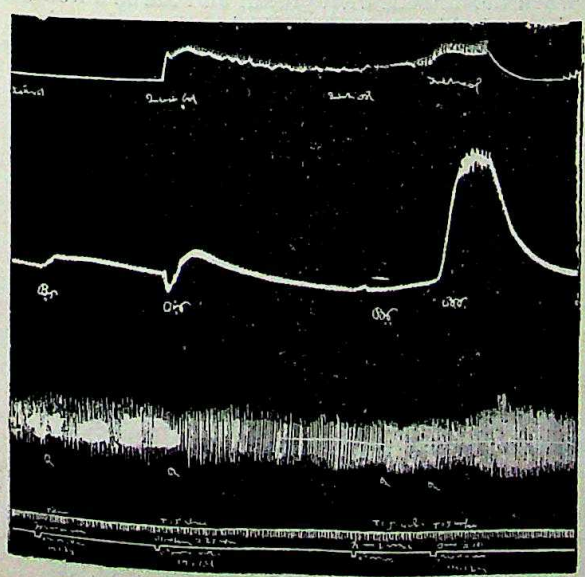
and no effect on intestinal movements. Pilocarpine causes a fall of blood pressure which is not followed by a rise, but with an increase in the amplitude; there is no effect on the bronchiole muscles, but there is a marked increase in intestinal movements. Of these three species, the rabbit gives the most marked adrenalin reaction, which would inhibit the action of most of these bases. The pilocarpine response suggests that there is a slight deficiency in the thyroid secretaions.

GRAPH VIII.—DOG.

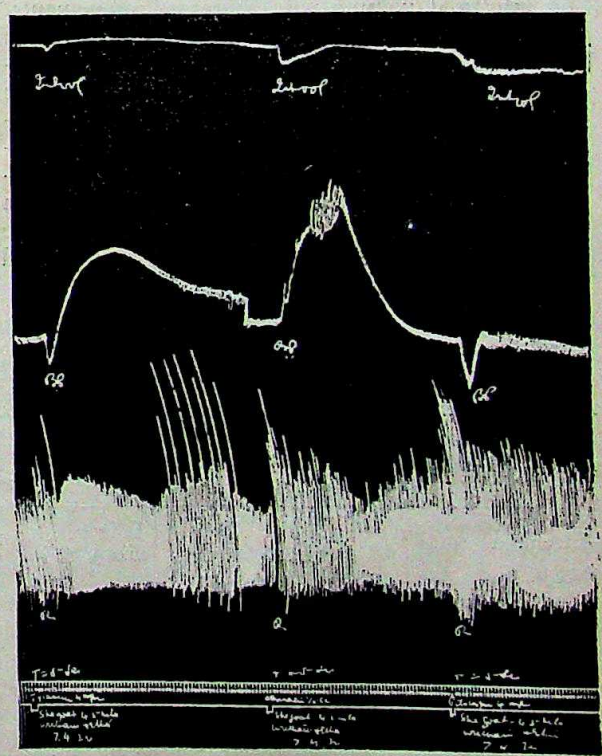
Tyramine. Pilocarpine. Adrenalin.

GRAPH IX.—MONKEY.



Tyramine. Pilocarpine. Tyramine. Adrenalin.

GRAPH X.—GOAT.



Tyramine. Adrenalin. Pilocarpine.

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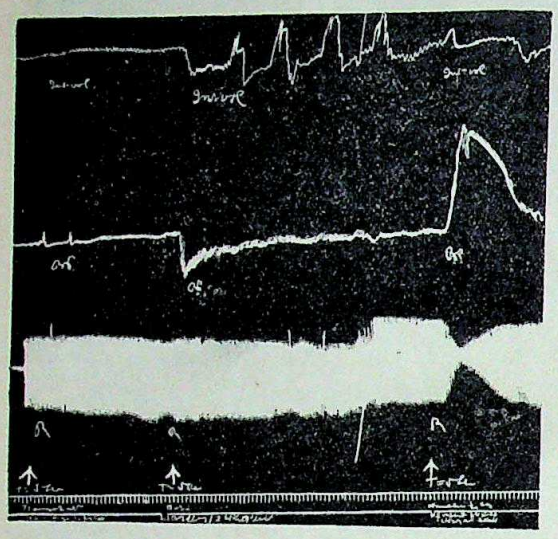
(*D*) *Goat.*—(Graph XI). In this animal, adrenalin causes a moderate rise of blood pressure, with an increase in the amplitude at the

GRAPH XI.—RABBIT.



Tyramine. Pilocarpine. Adrenalin.

highest point, with irregularity of the heart beat; the respiration is relaxed momentarily, followed by bronchiole constriction; there is a slight fall of intestinal volume. Pilocarpine causes a slight fall of blood pressure followed by a slight rise, and the amplitude of the heart beat is increased; there is slight bronchiole constriction, and a fall of intestinal volume with increased movements. Tyramine caused a slight initial fall, but this was probably due to an air bubble getting into the circulation. There was a large and persistent rise of blood pressure, the respirations were stimulated, and there was no appreciable effect on intestinal movements. These animals possess a moderate amount of adrenalin as judged by the adrenalin response, whilst the behaviour of pilocarpine and tyramine on their respiration and blood pressure suggests that these animals are hyperthyroid.

Summary.

We see therefore that the phenomenon of susceptibility in these different individuals and species depends to a large extent on the varying amounts of the endocrine secretions that are present in the tissues. We realise that we are presenting a simplified picture of a series of complex chemical inter-actions, where one chemical is aided or hindered by another. If we have succeeded in changing your views from the non-committal views that are now taught in terms of idiosyncrasy, susceptibility or sensitiveness, to a more rational idea of a physical and chemical defence mechanism, we will have attained the object which we had in view when we set out to solve this difficult problem. The subject is immense in range and cannot be elucidated by wild theories. It requires careful experimental and clinical evidence, which will then give us a complete understanding of a whole host of diseases such as scurvy, asthma, beriberi, etc., which are at present but little understood by our profession. The practical outcome of this work is as follows:—

(I) In Götsch's test for hyperthyroidism. If 0.5 c.c. of 1 in 1,000 adrenalin is injected, a rise of 10 to 50 mm. in blood pressure occurs which persists for 1½ hours, but many persons who are not thyrotoxic are also susceptible. In animals with an excessive amount of thyroxin there is little or no alteration of the respiration in spite of the rise of blood pressure, whilst in animals with an excessive amount of adrenalin in the tissues, the blood pressure is raised but the respiration is markedly slowed and the bronchiole muscle relaxed, so that the breathing is shallow.

(II) Adrenalin has an immediate action in normal animals, raising the blood pressure and causing bronchiole relaxation, so that it is a most efficient stimulus to the heart and blood vessels when the amount of thyroxin and adrenalin in the tissues is high. In animals in whom there is an excess of adrenalin or deficiency of thyroxin, it is a powerful relaxor of the bronchiole muscles.

This table summarises these results on normal cats and in those whose endocrine function has been altered experimentally.

Normal animals.		Thyroid.		Adrenals.		Pituitrin.
Drugs tested.	Reactions.	Animals fed on thyroid.	Animals' thyroid removed.	Adrenalin injected.	Adrenals removed.	
Adrenalin ..	B P + + Resp. – –	B P +++ Resp. +	B P + Resp. – – –	B P +++ Resp. – – –	B P + Resp. +	Increased amplitude of all involuntary muscle.
Tyramine ..	B P + + Resp. – –	B P +++ Resp. –	B P + long duration. Resp. – – – –	B P ± Resp. nil.	B P +++ Resp. – – –	
Pilocarpine ..	B P – Resp. –	B P – ++ Resp. +	B P – – – Resp. +++	B P nil. Resp. +	B P – – – Resp. + – –	

Blood pressure + = rise, — fall.
Respiration + = constriction, — relaxation.

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(III) The remote action of adrenalin is equally if not more important, as it diminishes capillary permeability, so that it is useful in the treatment of urticaria and giant urticaria and may therefore be useful in toxic œdemas, as, by diminishing permeability, it inhibits the action of these toxic bases on the myo-neural junctions.

(IV) An excess of thyroid secretion in the tissues would cause an increase in the action of these bases when acting on the vascular mechanism, but would prevent their action when acting on the bronchiole muscle.

(V) Commercial pituitrin increases the tone of the involuntary muscle and would therefore be useful in all flacid conditions of the involuntary muscles, visceroptosis, and intestinal stasis not due to mechanical obstruction.

(VI) Drug idiosyncrasy—e.g., to quinine—can be explained as follows. With hypochlorhydria and an increased alkalinity of the bowel more quinine would be absorbed and circulate in the blood. The defective action of the liver would act in two ways;—the absence of bile would increase permeability and the quinine would not be so rapidly altered into quitenene. A greater concentration of quinine circulating in the blood of a person with an excess of thyroxin would show its effects markedly on the circulatory system.

(VII) The susceptibility of certain individuals to certain food diseases, e.g., beriberi, epidemic dropsy, etc., is due to similar causes as the above, but in addition there is the antagonistic action of the vitamines, which decreases permeability, and prevents these poisons from acting on the tissues.

(VIII) The sensitiveness of the endothelium of the vessels to these bases—such as is seen in urticaria, giant urticaria, food asthma and in toxic œdemas—can be controlled by adrenalin injections, which diminish permeability and prevent these bases from acting.

(IX) Asthma may be caused by stimulation of the vagus or of the sympathetic. In the latter class of case both thyroid and adrenalin would be useful in the immediate and remote results by increasing this defence mechanism. In vagotonia these endocrine secretions would be useless. In either class of case it is necessary to find out and remove the underlying cause of the disease.

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THE EFFECT OF ENTERIC VACCINE ON ENDEMIC GOITRE IN CHILDREN.

By M. A. NICHOLSON, M.B.,
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Agency Surgeon, Wano.

McCARRISON has claimed considerable success in treating endemic goitre with vaccines; especially in using those prepared from intestinal organisms (1).

While Medical Officer of the Royal Lawrence Military School, Sanawar, I was able to observe the effect of prophylactic enteric inoculation on the cases of endemic goitre then prevalent in the school.

The Royal Lawrence Military School was founded by Sir Henry Lawrence in 1848, to serve as an asylum for the children of British soldiers serving in India from the fierce heat of the plains, and the still fiercer dangers that surround children in barrack life in India.

The school is situated on Sanawar Hill, at an altitude of 5,500 feet, at a distance of 3 miles from the cantonment of Kasauli.

It provides accommodation for 500 children; there being nearly equal numbers of both sexes, males slightly predominating.

The ages run from 3 years to 20 years and in consequence of the fact that many of the children are orphans and of the conditions of school life peculiar to India, many of the wards, as they are designated, spend 6 to 10 years continuously in the school.

The earliest records of the school note the incidence of goitre amongst the wards.

By 1899 the condition had become so prevalent that, when in that year, the supplementing of the spring water supply with rain water became necessary, owing to the partial failure of the spring, arrangements were specially made for a dual supply.

Rain water was reserved for drinking and cooking; spring water for washing purposes only.

It was hoped that this dual system, which was perfected with a double pipe supply, would eliminate goitre from the school.

To ascertain the progress being made to this end, the Inspector-General of Civil Hospitals of the Punjab, under whose medical jurisdiction the school lay, ordered a quarterly return of the names of all wards suffering from enlargement of the thyroid gland, commencing from October 1st, 1899.

The object of the dual water supply and of the return was soon lost; for in a few years the separation of the spring and rain water was discontinued, owing to a break down of the dual pipe supply, and from motives of economy. The return on the other hand continued to be rendered and probably still is.

It affords a complete record of all cases of goitre occurring in the school since October 1st, 1899.

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In June, 1900, a large proportion of the wards were inoculated against enteric fever. A record of this was kept.

Again in October and November, 1913, the majority of the wards were inoculated against the enteric group.

In 1900, the typhoid vaccine was that prepared by the R. A. M. C. College.

In 1913, the T. A. B. vaccine prepared by the Central Research Institute, Kasauli was used.

On each occasion two inoculations at intervals of seven to ten days were given in doses appropriate to the age of the child.

Taking the inoculations carried out in 1900:—

Of the wards present in the school at that time, i.e., on June 1st, 1900,—the records of 439 were available. Of these 189 had been inoculated and 250 had not been inoculated.

The number of those inoculated who became goitrous at any time after inoculation was 43 or 23.8 per cent.

The number of those not inoculated who became goitrous at any time after the date the inoculations were carried out was 63 or 25.2 per cent.

Of those inoculated the enlargement became manifest after:

One	year in	4 or	8·9 %
Two	years in	0 or	0·0 %
Three	years in	5 or	11·1 %
Four	years in	5 or	11·1 %
Five	years in	11 or	31·4 %
Six	years in	17 or	37·7 %
Seven	years in	1 or	2·2 %
Eight	years in	2 or	4·4 %
Nine	years in	0 or	0·0 %

Of those not inoculated the enlargement became manifest after:

One	year in	6 or	9·5 %
Two	years in	0 or	0·0 %
Three	years in	6 or	9·5 %
Four	years iu	1 or	1·3 %
Five	years in	19 or	30·1 %
Six	years in	24 or	36·0 %
Seven	years in	1 or	1·3 %
Eight	years in	5 or	7·9 %
Nine	years in	1 or	1·3 %

I do not think, therefore, there is any evidence that the 1900 inoculation had any prophylactic effect, near or remote, on the incidence of goitre in the school.

The number of cases returned as being goitrous before the date of the inoculation was 90.

Of these, 39 were subsequently inoculated and 51 were not inoculated.

Of the 39 inoculated the numbers ceasing to be returned as goitrous were:

Between	June 1900	and	June 1901	20 or	51·3 %
Do.	,, 1901	and	,, 1902	3 or	7·4 %
Do.	,, 1902	and	,, 1903	2 or	5·1 %
Do.	,, 1903	and	,, 1904	1 or	2·7 %
Do.	,, 1904	and	,, 1905	3 or	7·4 %
Do.	,, 1905	and	,, 1906	7 or	18·0 %
Do.	,, 1906	and	,, 1907	2 or	5·1 %
Do.	,, 1907	and	,, 1908	1 or	2·7 %

Of the 51 non-inoculated the numbers ceasing to be returned as goitrous were:

Between	June 1900	and	June 1901	26 or	54·9 %
Do.	,, 1901	and	,, 1902	3 or	5·9 %
Do.	,, 1902	and	,, 1903	7 or	13·7 %
Do.	,, 1903	and	,, 1904	3 or	5·9 %
Do.	,, 1904	and	,, 1905	0 or	0·0 %
Do.	,, 1905	and	,, 1906	5 or	9·5 %
Do.	,, 1906	and	,, 1907	3 or	5·9 %
Do.	,, 1907	and	,, 1908	1 or	1·9 %
Do.	,, 1908	and	,, 1909	0 or	0·0 %
Do.	,, 1909	and	,, 1910	1 or	1·9 %

I do not think, therefore, there is any evidence that the 1900 inoculation had any curative effect on the goitre prevalence in the school.

As regards the effect of the inoculations carried out in 1913:—

At this time the boys' department, or a little over half the school, was the subject of an experiment conducted by McCarrison (2) to ascertain the result of a bacteriologically clean water supply on the incidence of goitre.

It was, therefore, not possible to compare cases in the same way as in 1900.

The method employed therefore was to take a number of direct measurements of goitres from amongst the goitrous girls, and compare the results in those inoculated, and those not inoculated.

The girls were measured the day before the first dose of the inoculations was given, and at intervals of two or three days subsequently for a period of six weeks.

Towards the end of this period, attendances for various causes,—not the least being the absence of any startling curative effect,—tailed off considerably. Measurements were taken always at the same time, i.e., 10 a.m., and under as equal conditions as possible.

A metal centimetre tape was used over the largest circumference, which was marked with dots by silver nitrate to ensure the same circumference being measured on each occasion.

Table (A) tabulates the results.

It will be seen from the table that although many decreases in neck measurements occurred after inoculation, an almost equal number of decreases can be noted in those not inoculated.

Taken individually, the inoculations of 1913 with T. A. B., vaccine had no curative effect on the goitre prevalent.

Endemic goitre, especially in its milder forms and in the young and especially in the male, is a condition which is liable to spontaneous exacerbations and remissions.

This has been pointed out by McCarrison from figures supplied by myself (2).

As a further example I would quote the cases of 271 wards who entered the school after October 1904; and left before January 1st, 1913. These, therefore, are beyond the

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TABLE A.

Case.	Measurement before 1st Inoculation.	1st Inoculation.	Measurement one week from 1st Inoculation.	Increase or Decrease from preceding measurement.	2nd Inoculation.	Measurement 2nd week from 1st Inoculation.	Increase or Decrease from preceding week.	Measurement 3rd week from 1st Inoculation.	Increase or Decrease from preceding week.	Measurement 4th week from 1st Inoculation.	Increase or Decrease from preceding week.	Measurement 5th week from 1st Inoculation.	Increase or Decrease from preceding week.	Measurement 6th week from 1st Inoculation.	Increase or Decrease from preceding week.	Increase or Decrease of last Measurement over the 1st.
G.B. ..	33·50	*	33·50	..	*	34·00	+0·50	34·00	..	33·75	−0·25	..	..	..	..	+0·25
L.B. ..	37·00	*	34·50	−2·50	*	35·00	+0·50	34·00	−1·00	34·00	..	..	..	..	..	−3·00
L.C. ..	35·00	*	35·00	..	*	36·00	+1·00	35·75	−0·25	35·25	−0·50	..	..	..	..	+0·25
E.E. ..	32·00	*	32·00	..	*	31·75	−0·25	32·00	+0·25	30·75	−1·25	..	..	..	..	−1·25
I.E. ..	34·00	*	34·00	..	*	34·00	..	34·00	..	34·75	+0·75	35·00	+0·25	35·50	+0·50	+1·50
V.G. ..	32·00	*	32·00	..	*	32·00	..	32·50	+0·50	32·00	−0·50	32·00	..	33·00	..	..
E.S. ..	32·00	*	32·00	..	*	32·00	..	32·00	..	32·00	..	32·00	..	32·00	..	..
D.T. ..	33·00	*	32·00	−1·09	*	31·75	−0·25	33·25	+1·50	32·50	−0·75	31·00	−1·50	31·00	..	−2·00
M.C. ..	32·00	*	31·50	−0·50	*	31·00	−0·50	32·50	+1·50	32·75	+0·25	33·00	+0·25	..	..	+1·00
E.K. ..	33·00	*	32·00	−1·00	*	31·00	−1·00	32·00	+1·00	31·00	−1·00	30·75	−0·25	..	..	−2·25
D.M. ..	29·00	*	28·50	−0·50	*	28·50	..	..	..	27·50	−1·00	27·50	..	..	..	−1·50
E.Q. ..	32·00	*	31·00	−1·00	*	30·00	−1·00	31·00	+1·00	30·00	−1·00	30·00	..	..	..	−2·00
I.W. ..	28·00	*	28·00	..	*	28·00	..	28·00	..	28·00	..	27·00	−1·00	..	..	−1·00
C.O. ..	31·50	*	31·50		*	32·50	+1·00	31·00	−1·50	30·75	−0·25	31·00	+0·25	..	..	−0·50
M.L. ..	30·50	*	30·00	−0·50	*	30·00	..	30·50	+0·50	31·00	+0·50	29·00	−3·00	..	..	−1·50
L.C. ..	36·00		35·50	−0·60		36·50	+1·00	35·50	−1·00	34·50	−1·00	..	..	..	..	−1·50
I.E. ..	36·00		35·00	−1·00		34·00	−1·00	34·00	..	35·00	+1·00	..	..	..	..	−1·00
E.P. ..	30·00		30·00	..		28·00	−2·00	29·00	+1·00	30·00	+1·00	..	..	..	..	..
E.M. ..	35·00		34·00	−1·00		33·00	−1·00	32·00	−1·00	..	..	..	..	..	..	−3·00
M.J. ..	32·00		32·00	..		32·00	..	..	..	..	..	..	..	..	..	..
C. ..	26·50		26·00	−0·50		25·00	−1·00	..	..	..	..	..	..	..	..	−1·50
	32·40	*	31·80	−0·60	*	31·80	..	32·30	+0·50	31·80	−0·50	30·75	−1·05	..	..	−1·65
	34·20		32·00	−2·20		31·20	−0·80	32·70	+1·50	..	..	..	..	..	..	−1·50

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influence of any inoculation or water-purifying operations, but they all became goitrous.

Of these, the number in which the goitre persisted from its first appearance until the ward left the school was 131 or 48 per cent.

While the number in which after its first appearance the goitre disappeared while the ward was still in the school was 140 or 52 per cent.

Out of these 271 cases of goitre the course of the condition was continuous in 170 or 62 per cent. and in 101 or 38 per cent. the course was interrupted, i.e., there were remissions and subsequent relapses.

That is to say, half the cases of goitre, occurring at the school, disappeared spontaneously, while still at the school; and nearly half the cases showed remissions of the condition during its course.

Table (B) shows the detailed history of 17 of the above cases as revealed by the quarterly return.

The course was continuous in 65 or 51 per cent., and interrupted in 61 or 49 per cent.

This tends to show that goitre in males is more liable to spontaneous cure, but less liable to fluctuations and remissions, than in females.

Conclusions.

1. Neither T. A. B. nor enteric vaccine had any effect, curative or prophylactic, remote or near, on the endemic goitre prevalent at the school.

2. Endemic goitre is a condition peculiarly liable to spontaneous disappearance and reappearance, in its endemic form amongst children.

3. These fluctuations of the thyroid should be taken into consideration in judging the effect of any particular line of treatment.

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(1) McCarrison, Milroy Lectures on Goitre.
(2) An Enquiry into the Causation of Goitre at the Lawrence Military Asylum, Sanawar. McCarrison. *Indian Journal of Medical Research*, April 1914.

TABLE B.

Year	1905				1906				1907				1908				1909				1910				1911				1912			
Quarter.	1	2	3.	4.	1.	2.	3.	4.	1.	2.	3.	4.	1.	2.	3.	4.	1.	2.	3.	4.	1.	2.	3.	4	1.	2.	3.	4.	1.	2.	3.	4.
H. T. ..			G	G	G	G	G	G	G			G																				
R. S. ..							G	G	G		G																					
N. D. ..		G		G																												
C. F. ..						G	G	G	G	G		G																				
H. J. ..						G	G	G	G	G		G																				
H. W. ..							G	G	G	G		G																				
A. A. ..			G	G	G	G	G	G	G	G	G	G	G			G																
Q. M. ..									G	G	G					G																
W. K. ..	G	G	G	G		G	G				G																					
B. B. ..						G	G	G	G			G	G	G	G	G	G	G	G	G	G			G								
L. H. ..				G			G																									
B. G. ..																																
S. O. ..												G	G	G	G	G				G					G			G				
B. I. ..							G																									
B. E. ..			G	G	G	G	G	G	G	G	G	G	G	G	G	G	G				G					G						
C. C. ..						G								G	G	G											G					
K. L. ..						G																										

N. B. GGG G indicates present at the School.
indicates the quarters in which returned as being goitrous

It is interesting to note that in this series of 271 cases—of whom 145 were boys and 126 girls—in the boys, goitre persisted from its first appearance until the ward left the school in 61 cases or 42 per cent. Goitre disappeared before the ward left the school in 84 or 68 per cent. The course of the goitre was continuous in 105 or 72 per cent. and was interrupted in 40 or 38 per cent.

Among the girls, goitre persisted from its first appearance until the ward left the school in 70 or 55 per cent. It disappeared before the ward left the school in 56 or 44 per cent.

ON TRANSIENT INFECTIONS WITH *LEISHMANIA DONOVANI* IN MAN AND ANIMALS.

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and
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From the Department of Protozoology, Calcutta School of Tropical Medicine.

IN a previous memoir, Knowles, Napier and Das Gupta (1923) have shewn that when the parasite of kala-azar was present in the blood,

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spleen or liver juice of man in its leishmania phase is injected into an experimental (vertebrate) animal, one of four results may follow:—

(*a*) The infection may never take at all, the animal remaining well and fit, and films and cultures from its liver juice shewing no parasites. This is the most usual result in the laboratory. In Table VII (A) of the memoir already quoted. out of 23 monkeys, 11 dogs, 20 white rats and 14 white mice so injected; 19 monkeys, 9 dogs, all 20 white rats and 13 white mice failed to shew infection; or in all 61 failures out of 68 animals inoculated,—a failure rate of 89.7 per cent.

(*b*) If the injection be given intradermally, occasionally a localised skin lesion may result,—the lesion shewing very marked differences from those produced by *L. tropica;* e.g., the "dermal leishmanoid" monkey whose history is given on pp. 325, 326, Plate A and Table III (C) of the same memoir. It should be noted further that the infection apparently failed to visceralise in this animal. Row (1914) also succeeded in producing a localised skin lesion in a monkey, but in this instance by the intradermal injection of cultures of *L. donovani* shewing "post- and super-post flagellate" forms.

(*c*) Occasionally the injected animal may appear to remain in good health; but on repeated liver puncture and on examination of films and cultures from liver juice, it is found that the animal has acquired a transient and symptomless —or almost symptomless— visceral infection with *L. donovani.* Five animals out of the 68 referred to in Table VII (A) of the same memoir shewed this sequence of events, viz.:—

Monkey No. 1.—Blood cultures negative on the 48th day after injection. Splenic enlargement with spleen puncture films or cultures *positive* on the 81st and 150th days after injection. Spleen and liver puncture films and cultures negative on the 199th day. Blood culture negative 14 months after injection. Animal then in excellent health.

Monkey No. 2.—Spleen and liver puncture films and cultures negative on the 60th and 74th days after injection. Spleen and liver puncture films and cultures *positive* on the 95th and 223rd days after injection. Liver puncture films and cultures negative on the 284th day; animal in good health.

Monkey No. 16.—Liver puncture cultures *positive* on the 50th day. Animal chloroformed when dying from beriberi on the 98th day; films and cultures from the viscera all negative.

Monkey No. 21.—Cultures from liver puncture fluid *positive* on the 31st, 50th and 88th days after injection, —films being negative. Animal never shewed splenic enlargement. Was in excellent health 7 months after injection. Liver puncture carried out in the 8th month—(after publication of the previous paper)—gave negative results in films and cultures.

Pup. No. 10.—Liver puncture films negative, cultures *positive* on the 51st day after injection. Liver puncture films and cultures negative on the 99th day after injection. Animal in good health 6 months after injection.

The blood sera of monkey No. 16 and of pup. No. 10 gave a negative aldehyde reaction at the time when cultures from their liver juice gave a growth of *L. donovani.*

In the words of the original memoir, "what we get—usually—, when a positive result occurs, is not kala-azar, but a transient, symptomless, leishmania infection, the existence of which can only be demonstrated by culture of liver puncture fluid on N.N.N. medium, or by the chance finding of very scanty parasites in smears from the organs." The incidence of this condition was in 5 out of 68 animals inoculated,—or 7.4 per cent.

(*d*) Lastly, the animal may develop acute kala-azar, the disease in the experimental animal conforming in every respect with that in man, and ending fatally, whilst films from the spleen, liver and other viscera both during life and after death shew innumerable *L. donovani,* and cultures from such material are richly positive. One such animal—(Pup No. 2)—is recorded in Table VII (A) of the memoir; whilst another animal, Monkey No. 24, of Table VII (B)—acquired acute and fulminating kala-azar apparently by the oral route. Shortt (1923, p. 1157) records that of 13 monkeys—*M. rhesus*—inoculated with spleen or liver emulsion, 10 gave positive findings of *L. donovani* subsequently, but in only two of these did acute and fatal kala-azar develop. Even accepting his figure of 2 out of 13, the incidence of the acute disease in experimental animals is only 15.4 per cent., whilst in the Calcutta series of experiments it has been much less;—2 out of the 82 animals in Tables VII (A) and VII (B) taken together, or only 2.4 per cent.

Does a similar state of affairs prevail with regard to *L. donovani* infection in man in the endemic and epidemic kala-azar areas? There is evidence that it does, and it is with a view to analysing such evidence that the present paper has been written.

(*a*) Even in its most acutely epidemic form, kala-azar is a disease which affects only a minority of the persons living in an infected area. The worst Indian epidemic of which we have any accurate record was that in the Nowgong District of Assam in the decade 1891-1901. During this decade, according to Sir Leonard Rogers (1910, p. 42), there was a decrease of the total population of the district of 24 per cent.; or if only the indigenous Assamese be considered, of 31.5. per cent. This decrease,—appalling though it is,—includes deaths from diseases other than kala-azar and loss of population from emigration.

It is probably true that many persons living in an endemic kala-azar area are not merely exposed to infection, but are actually inoculated with the parasite of kala-azar, and yet do not acquire the disease. Such a view would be in keeping with what we know of other human protozoal diseases; for instance Dobell and O'Connor state that in only some 10 per cent. of *E. histolytica* carriers do symptoms of amœbiasis occur, whilst Christophers has shewn that a single heavily infected anopheline mosquito is likely to do far more damage in malaria transmission than are many slightly infected ones. In addition to factors affecting the dose of infective virus injected (or ingested) in the case of kala-azar, the experience with our experimental animals,—the great majority

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of which failed to take the infection even after such massive injections as 10 c.c. of spleen emulsion intraperitoneally plus intravenously—suggests that other factors in the vertebrate host may determine whether the infection does or does not take.

Hitherto man has been regarded as being relatively susceptible to infection with kala-azar, and animals as being relatively insusceptible. This view, however, is possibly not correct. If 90 per cent. of experimental animals inoculated with big doses under laboratory conditions entirely escape infection, possibly a similar proportion of a population not merely exposed to risk but actually inoculated with the parasite, might escape the disease. The slow mode of spread of kala-azar may not necessarily mean that only a minority of individuals in the area are exposed to risk; if man be as insusceptible to infection as are laboratory animals, possibly the majority of persons living in an infected area are freely exposed to risk, but in only a small proportion of them do the parasites multiply sufficiently to produce symptoms. Instead of the distribution of the parasite in the outside environment being a very limited one, and man but little exposed to risk; the distribution of the parasite in the outside environment may possibly be widespread, but man be relatively insusceptible to infection.

(*b*) That *L. donovani* may cause dermal lesions is shewn by Dr. Brahmachari's and Dr. Bhattacharji's cases of "dermal leishmanoid" referred to in the memoir already quoted. In both these patients the visceral disease had been cured long before the skin lesions became apparent, in one instance culture of the peripheral blood and in the other of spleen juice gave negative results. Yet such cases constitute a rarity in man, just as do cases of intradermal localised infection in experimental animals.

(*c*) There is an increasing volume of evidence that transient visceral leishmaniasis may occur in man. It is not always symptomless.

In the first place the mortality in untreated cases of kala-azar is not always cent. per cent. Sir Leonard Rogers (1910), writing several years before he introduced the tartar emetic treatment into this country, records that Dr. Dodds Price had a 96 per cent. case mortality among several hundred cases in the Nowgong epidemic. Among 500 later cases systematically treated with quinine, the case mortality was only 75 per cent. Rogers' own figures for 65 cases treated at the Presidency General Hospital, Calcutta, gave 21 per cent. as having been alive and in good health some months to upwards of a year after the cessation of treatment. As the "treatment" in vogue in those days was with large doses of quinine, supplemented in some cases by staphylococcus and other vaccine injections, and as our further experience of the disease has shewn that such treatment has but little influence on the disease, we are on safe ground in claiming that the mortality rate in untreated cases of kala-azar does not ordinarily exceed 80 per cent.; it may indeed be a considerably lower figure.

There are already recorded in the literature cases where proved infection with *L. donovani* has been transient, and sometimes symptomless. Patton (1914, p. 503) records the case of an Anglo-Indian female aged 24, said to have had fever for only ten days, a year prior to examination, and with no enlargement of the spleen or liver, in whose peripheral blood parasites were found in the fourth film searched. Knowles (1920, p. 142) records the case of the mother of a child which died from kala-azar, the husband being also infected, who had no suspicion that she was infected. Upon examining her, the spleen was found to be appreciably enlarged and spleen puncture showed *L. donovani*. Mackie (1922, p. 330) says that he saw a patient in 1913 in the pre-antimony days who had been free from fever and other signs of the disease for several years and who was working as a bungalow servant. The spleen was found, however, to be enlarged and hard, and spleen pucture shewed the presence of *L. donovani*. This case Mackie regards as being an instance of a "genuine carrier" of the disease.

To these cases the writers now desire to add details of two others which have recently come under their notice.

Case 1.—An Indian Christain girl, aged 11, was admitted to the Carmicheal Hospital for Tropical Diseases from a mission orphanage in Elliott Road, Calcutta, on the 6th August, 1922. There was a history of prolonged and irregular fever, but the spleen and liver were not enlarged. The temperature was 102°F. on admission and thereafter slowly declined. It reached normal on the 6th day after admission, and thereafter remained normal.

Blood examination:—Aldehyde reaction negative. Widal reaction negative. No parasites seen in blood films. Hæmoglobin 65 per cent. Total red corpuscles 4,862,500 per c.mm. Total leucocytes 3,744 per c.mm. Differential count on 250 leucocytes:—eosinophiles 0.4 per cent.; polymorphonuclears 35.6 per cent.; small mononuclears and lymphocytes 40.8 per cent.; large hyalines and transitionals 23.2 per cent.

Quinidine, gr. iv t.d.s. was administered from the 5th day in hospital. The temperature immediately dropped to normal; and, as the patient was anxious to go home, she was discharged on the 8th day after admission and instructed to continue a month's quinidine treatment.

In the meantime a routine culture of the peripheral blood had been taken on the 3rd day after admission. After the patient's discharge from hospital, this culture, examined 8 days after taking it, shewed *L. donovani* in fair numbers.

The orphanage authorities were now informed. As there was no bed vacant, the child could not be readmitted. The orphanage authorities, however, stated that the child was doing very well indeed. She was brought up for examination six months later. There had been no fever during this interval; there was no enlargement of either the liver or spleen; and a culture of the peripheral blood remained sterile and free from parasites. Seen again still a year later she was in excellent health, with no symptoms or signs of disease. No anti-kala-azar treatment was given.

This case appears to be clearly one of transient leishmania infection with spontaneous cure.

Case 2.—R. C., Hindu male, medical practitioner, resident in Calcutta. Attacked on the 23rd December,

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1923, with high fever and rigor. The temperature then dropped to normal with profuse sweating. The second day it rose again, but there was no rigor. From the third day onwards there was high continued fever with repeated rigors (three in 24 hours on the third day), severe retching and bilious vomiting.

At this stage the case appeared to be one of malignant tertian malaria. Examination of blood films on the 25th and 27th December failed to shew malarial or other parasites.

Rigors ceased on the 5th January, 1924,—(14th day of illness)—but the temperature remained high and continuous. On the 7th January the patient became unconscious and collapsed. He was brought round with some difficulty, and thereafter the course of the illness resembled that of an infection with enteric fever. The fever continued for 43 days in all and gradually dropped to normal by lysis; the bowels were constipated throughout; the spleen was just palpable, and the liver not enlarged. In clinical terms,—and unassisted by laboratory diagnosis,—the case would probably have been recorded as one of "typho-malaria."

On the 15th day of illness, the blood picture was as follows:—Hæmoglobin 60 per cent. Total red corpuscles 4,000,000 per c.mm. Total leucocytes 6,000 per c.mm. Differential leucocyte count:—eosinophiles 3 per cent.; polymorphonuclears 60 per cent.; small mononuclears and lymphocytes 28 per cent.; large hyalines and transitionals 9 per cent. The Widal reaction (carried out in Major Acton's laboratory) shewed a positive agglutination to *B. typhosus* at a dilution of 1 in 100.

Brahmachari's globulin test,—(performed by some outside laboratory)—was negative. A peripheral blood culture, however, taken on the 15th day of illness, shewed a growth of *L. donovani* flagellates ten days later.

It was therefore clear that the patient had kala-azar, —whether with or without malaria and typhoid fever as complications must remain uncertain. He made a slow recovery. At the end of March 1924 the spleen was not sufficiently enlarged for puncture. A peripheral blood culture was taken. It was examined on the 10th day and no leishmania could be detected: subsequently it unfortunately became septic. A third culture of the peripheral blood, taken about the beginning of April, also unfortunately became septic. A fourth culture of the peripheral blood, taken on the 4th May 1924, remained sterile and negative on the 20th May 1924.

The patient's illness may be said to have terminated about the 6th of March. At the time of writing, at the end of May, the patient is in fair health but debilitated after his prolonged illness. The spleen and liver are not palpable. There is some anæmia, but no fever at all. He is able to carry out his duties. When last seen, he was advised to "carry on," and to return for examination if there was any recurrence of fever. No anti-kala-azar treatment has been given.

In this instance we have a patient with a clinical history suggesting a combination of malaria and typhoid fever; a proved diagnosis of *L. donovani* infection; and apparently spontaneous recovery.

It would therefore appear that transient,—but not necessarily symptomless,—infection with *L. donovani* may occur in man.

(*d*) That acute kala-azar may follow exposure to infection is a commonplace. The mortality in treated cases is to-day,—despite the successful antimony treatment,—some 10 per cent. or more.

The writers have no desire to dogmatise, and the evidence at present available is insufficient upon which to found any conclusions. But if infection with *L. donovani* in man be at all like infection with *L. donovani* in experimental animals in the laboratory, then our ideas as to the epidemiology of kala-azar may need some revision. It would be of interest if kala-azar in man were but the end-phase, as it were, of a more widespread and usually symptomless herpetomoniasis of man, i.e., a harmless infestation with *L. donovani*. Such a hypothesis might explain the apparently wide variation in incubation periods of the disease in man; an intensive infection in an already debilitated subject being followed by the onset of kala-azar within a period measurable in days; on the other hand a prolonged and more or less symptomless infestation of months or even years' duration only developing into the disease known as kala-azar on the onset of some severe intercurrent infection such as an attack of malaria, of enteric fever, or of bacillary or amœbic dysentery.

Such a suggestion is, however, intended as a suggestion merely, and the writers do not intend to emphasise it in any way. Yet there may be some widespread, and as yet not understood factors underlying the curiously different modes of onset and the slow spread of the disease.

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SOME EXPERIMENTS ON THE INJURIES PRODUCED BY FIREARMS AT SHORT RANGE.

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IN medico-legal shooting cases a question that turns up from time to time is :—What can be inferred from the appearance of the injury as to the weapon used and the range ? If the weapon used is known, or if the bullet or shot can be found and the sort of weapon used can be deduced from them, the advice commonly given in text-books, that the investigator should make experiments for himself with the actual weapon or one similar to it, is very sound. In many cases, however, neither the weapon nor the bullet can be found, or for other reasons this advice is impracticable, and all that there is to go on is the injury. On this point the data given in text-books are often lacking in precision, especially as to the effects of modern weapons.

Some experiments, therefore, were made to see what answer could be given to the question, when nothing was known as to the

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nature of the weapon used. As in the majority of shooting cases the shot goes through the clothes, pieces of cotton cloth hung over sandbags were chosen for the target, and were shot at, using various weapons, at ranges from nothing up to ten feet. The range was measured from the muzzle of the gun to the target, and the experiments were made in the middle of the day in the Arsenal, Fort St. George, with a shade temperature of about 105°F.

The weapons used were:—

(1) A 303 service rifle firing service ammunition, (cordite).

(2) A 375 Mannlicher-Schörner, high-velocity, sporting rifle, firing axite and an expanding nickel-cased lead bullet.

(3) A 400-450 high-velocity sporting rifle, firing 60 grains of axite and a 400 grain nickel cased lead bullet.

(4) A 450 service revolver firing service ammunition, (cordite).

(5) A 476 Martini-Henry smooth bore gun, firing black powder and a spherical lead bullet

(6) A 12 bore shot gun firing smokeless powder (K. S. G.) and No. 5½ shot.

From amongst these weapons, the black powder gun could easily be distinguished from all the others by the grains of unburnt black powder which were left, generally firmly embedded in the cloth, all round the injury. These grains of powder were very apparent at all ranges up to 10 feet—the longest range tried. Their presence is a certain sign that the injury was caused by a black powder weapon, and their absence makes it probable that either a smokeless powder weapon was used or that the range was well over 10 feet.

The shot gun could be distinguished from the others by the large ragged hole the shot made, and in any case it is very unlikely that where this type of weapon is used none of the shot should be found.

The revolver could be distinguished from all the others at ranges below 5 feet, by the presence of grains of unburnt cordite all round the bullet hole. In none of the long-barrelled weapons firing smokeless powder were any grains of unburnt explosive to be seen.

For each of the above weapons there was a definite range below which the cloth round the shot hole was blackened, as is shown in the following table:—

Weapon.	Blackening begins to show at.	Blackening very definite at.	Scattered grains of unburnt explosive up to.	—
(1)	6 inches	2 inches	..	
(2)	No blackening.		..	
(3)			..	v. note (1)
(4)	1 foot	6 inches	5 feet	
(5)	4 feet	3 feet	over 10 ft.	v. note (2)
(6)	3 feet	2 feet	..	

Notes.

(1) The cloth was set on fire at ranges below one foot.

(2) Although in these cases there was no blackening, at ranges below six inches the nap of the cloth was blown off by the blast of gases.

The presence or absence of blackening shows the ranges to be less than or greater than four feet with any of the above weapons, while from the other considerations noted a closer estimate of the range can often be given.

Two other experiments were made to try to test the theory that a revolver pressed tightly against the skin of the body, may go off and no serious injury be produced. Cases of attempted suicide have been recorded in which this is said to have occurred. (Glaister. *Med. Jurisp.* 1902, p. 202).

In the absence of any volunteers for a more accurate reproduction of such a case, the skin in our experiments was represented by a piece of stiff leather stretched over a sandbag. An old service revolver, with an eight-inch barrel, was fixed between sandbags with its muzzle pressed hard against the leather, and a service cordite cartridge fired from it. Each time, although the revolver was sufficiently firmly fixed for it not to have been shifted by the recoil, the bullet pierced the leather and was lost in the depths of the sandbag. We think, therefore, that such an accident could not happen with a service revolver firing cordite ammunition, or indeed with any but the very worst ammunition.

The author quite realises the desirability of more extensive experiments on all the points raised in this paper, which is offered for publication in the hope that others may be induced to record more experiments with different weapons.

The thanks of the author are due to Lieutenant E. F. Harvey, Att. I. A. O.C. for his most valuable assistance in all these experiments, and for the loan of some of the weapons used.

INTESTINAL COLEOPTERA.

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THE occurrence of a pathological condition associated with the presence of living beetles in the human intestine has attracted the attention of several observers of late years, both in Bengal and in the low-country of Ceylon. Cases occur principally in children of both sexes between the ages of three and five years, with symptoms pointing to an obscure form of diarrhœa, sometimes associated with griping and emaciation. The living

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ing beetles may be passed out naturally with the stools, but in several cases they have been passed out under medical observation following a rectal injection. There is thus no doubt about the actual occurrence of the beetles in the intestines. It is not a case of mistaken observation of beetles attracted to the stools after evacuation.

These beetles, so far as they have been observed hitherto, are all small species of the true dung-beetles belonging to the sub-family Coprinæ of the family Scarabæidæ. Those definitely noted are *Onthophagus bifasciatus*, another undetermined species of *Onthophagus*, and *Caccobius mutans*. All of these beetles, with the other species of the large group of Coprinæ, feed normally on dead animal matter and especially on animal excrement. Patches of cattle dung or human ordure, if examined, will usually prove to have some of these dung-beetles in them, the beetles being attracted to the excrement, as soon as it is dropped, by their sense of smell, burrowing in and under it, feeding on it and carrying it away in order to bury it in the soil, where they may either feast on it at leisure or deposit their eggs in it. An excellent account of the habits of these beetles, attracted to human ordure, will be found in Major R. W. G. Hingston's book, "A Naturalist in Hindustan."

The beetles implicated in cases of human infection being of common occurrence in human excrement, after it has been evacuated, it still remains to be shown how the beetles can obtain access into the human intestines. This is still a moot point, which was discussed at some length in connection with two papers read at the Fourth and Fifth Entomological Meetings, held at Pusa in 1921 and 1923, respectively. So far, we are without any exact information on this point, and any opinion given can be at the best only a guess at the truth.

To me, however, the following facts seem to be significant, so far as exact details are available:—

(1) Only the adult beetles have been passed out in all recorded cases.

(2) In seven cases in which the sex of the beetles was recorded, six were females and only one a male.

(3) Except in one case (when an adult at Hoolarhat was concerned), all the cases reported have occurred in children of ages about three to five.

(4) All cases have been reported from hot moist areas in Lower Bengal and the low-country of Ceylon.

Bearing these facts in mind, it seems to be most probable that the adult beetles, guided by their keen sense of smell in the search for human ordure, themselves effect an entrance through the anus, when this part of the body is exposed, unprotected by clothing, during sleep in warm weather and is probably soiled to some extent, especially in the case of young children who have not yet learnt cleanly habits.

As this condition seems to be not uncommon in Lower Bengal, it is to be hoped that medical practitioners, who may come across cases, will record details and, in particular, will secure specimens of the beetles concerned, so as to afford further information on this subject. Specimens may be dropped into a small phial or tube of rectified spirit, *inside* which should be placed a label with brief particulars written *in pencil*. Such specimens may be sent either to the Calcutta School of Tropical Medicine or to the Imperial Entomologist, Pusa, for examination and identification.

IS LEPROSY CURABLE ?

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THIS question has been discussed so much of late that a few incontrovertible facts may be of interest. These are in the form of the tabulated results of the leprosy out-dispensary held in connection with the Calcutta School of Tropical Medicine.

While some 600 cases have attended the dispensary during the last 3½ years, many of these have come for advice and continued treatment under private practitioners. Others obtained a certain amount of benefit and, considering themselves cured or not being able to attend for a longer period, discontinued treatment before they had reached a stage at which we could pronounce them free from all active signs of the disease and therefore apparently cured.

Discarding all such cases, we have tabulated those in which the patients have persisted with treatment up to date or till they were considered as free from all active signs.

The tabulated cases are 203 in number, and of these 43 have lost all signs of disease. Some of these are still under treatment, others come at monthly, 3 monthly, or 6 monthly intervals for inspection. They have been free from the disease for periods varying from 3 months to 3 years.

The method of classification is important. "A" represents nerve cases which have been diagnosed from the presence of anæsthesia and other nerve symptoms, but in which the bacteriological examination was negative for lepra bacilli. "B" represents those cases in which the bacteriological examination was positive. A_1 represents primary nerve cases and A_2 secondary nerve cases. B_1 includes early bacteriologically positive cases, B_2 those of a more advanced degree and B_3 cases with great lepromatous thickening of the skin and very large numbers of lepra bacilli.

As was pointed out by Hansen long ago (Leprosy, Hansen and Looft, Walker's Translation, p.67)

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and was lately elaborated by me (*Lancet*, Feb. 9th, 1923), leprosy is a self-healing disease. When the disease has burned itself out after many years of suffering, the end lesions are generally trophic ones due to fibrous contraction in the nerve trunks causing destruction of nerve fibres. It is such cases that crowd the leper asylums and settlements when they are no longer able to make a livelihood due to their deformed fingers and toes, but careful search will generally fail to detect any lepra bacilli. These are the secondary nerve cases designated A_2, and all the other classes if they survive long enough tend to pass into this class. To anyone who has studied the pathology of such cases it will be evident that treatment can only alleviate the sufferings of such cases. It cannot restore the lost fingers and toes or the destroyed nerve fibres. In such cases sensation can only be recovered to a limited extent and yet I have found such cases being treated in leper asylums and leprosy treatment being unfavourably reported on since they did not recover complete sensation. Many of such cases are no more suffering from leprosy than are pock-marked people suffering from small-pox. The disease has died out and has only left its scars.

Just as most cases end in A_2, so most cases begin with A_1. That is to say the disease may first be diagnosed by an anæsthetic patch which gives bacteriologically negative results on examination.

This is of extreme importance as will be seen from the table, for, though 36 A_1 cases are shown with active signs still remaining and 32 free from all active signs, yet, if cases which have been treated for less than a year are excluded, the proportion is 16 without active signs to 7 with them, and this favourable proportion increases steadily as treatment progresses. The same holds good to a more limited extent with B_1 cases.

Now if (as I hold to be undoubtedly the case) almost all cases have to pass through A_1 and B_1 before they reach A_2 and B_2, B_3, and if, as the table shows, A_1 and B_1 cases can be almost invariably freed from all active signs of the disease, we have in our hands a method of dealing with the disease which only needs to be efficiently applied to stamp out leprosy.

The essentials are—

(1) Sufficient dispensaries run by trained doctors who have studied the disease.

(2) Diagnosis if possible in the A_1, B_1, stage.

(3) Treatment, consisting in carrying out special treatment, in removing predisposing causes and in increasing the general resistance of the body.

Existing treatment by the esters of hydrocarpus, chaulmoogra and other oils is very effective, but has never been considered a "specific" (in the sense that it would unaided cure every case subjected to it) by anyone who has had anything to do with its application.

It is questionable if such a specific will ever be found either for leprosy or for the sister disease tuberculosis. Leprosy as an indigenous disease was stamped out of England long ago while tuberculosis is disappearing tardily 300 years later. There is every reason to believe that leprosy can be stamped out of India and other tropical and subtropical countries simply by the means suggested above and without any so-called specific.

As far as I can understand its objects, this is what the new British Empire Association is out to do and, if it does not succeed, it will not be for want of a remedy to hand, but for want of sufficient support being given to its efforts.

TABLE.

		Length of Treatment in Months.									
		1—3	4—6	7—9	10—12	13—15	16—18	19—21	22—24	Over 24	Total.
A_1	All signs of active disease gone.	1	4	4	7	3	6	3	2	2	32
	Still signs remaining.	13	5	2	9	2	3	2	...	...	36
A_2	All signs of active disease gone.	...	...	...	...	...	...	...	...	...	...
	Still signs remaining.	5	5	3	1	1	1	2	1	..	19
B_1	All signs of active disease gone.	..	..	1	4	1	1	...	1	...	8
	Still signs remaining.	10	4	3	2	3	1	...	...	...	23
B_2	All signs of active disease gone.	...	...	...	1	...	1	1	...	...	3
	Still signs remaining.	21	6	5	8	6	6	3	3	10	68
B_3	All signs of active disease gone.	...	...	...	...	...	...	...	...	...	...
	Still signs remaining.	5	1	1	1	6	...	...	...	...	14
	TOTAL. ...	55	25	19	33	22	19	11	7	12	203

A_1 = Primary nerve cases.
A_2 = Secondary nerve cases coming on after B_2 and B_3.
B_1 = Bacteriologically positive cases of 1st degree.
B_2 = Ditto of 2nd ,,
B_3 = Ditto of 3rd ,,

This is a table of 203 dispensary cases that have persisted with treatment up to date or to a relative cure; other cases showed marked improvement but left off treatment for various reasons before they were considered relatively cured.

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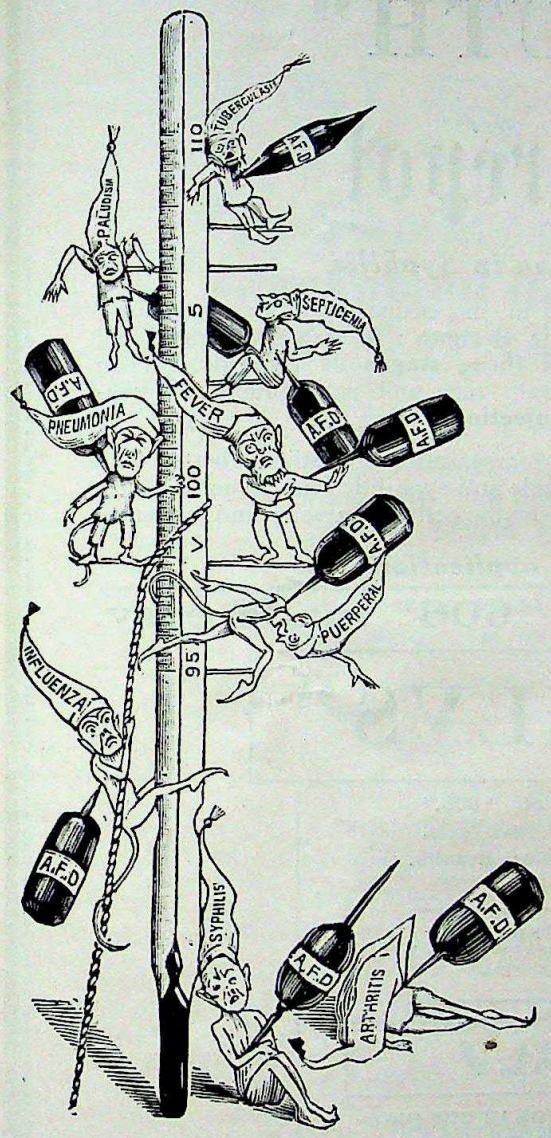
THE PHYSIOLOGICAL ACTION OF THE CACODYLATES CYTO-SERUM



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When we study the physiological action of CACODYLATES on the digestive apparatus, on the nutrition, on the circulation, the respiration, the nervous system and on the skin, we find that the use to which this drug may be put satisfy many indications.

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Anemia, particularly Pernicious Anemia, Chlorosis, Dyspeptic Anorexia, Syphilis, Paludism, Septicemia, Fever, Pneumonia, Puerperal, Influenza, Arthritis, Tuberculosis, Depressed State of the Nervous System, General Debility. All Atonic Cases.

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The vehicle of special serum is isotonic, which is extremely important in considering rapid absorption and tolerance of the medication.

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THE COMPLICATIONS OF GONORRHOEA. (Vide Lancet Report of 13-1-1923 by Officer In Charge of Gonorrhœal division, Military Hospital, Rochester Row, S.W.)

"For the treatment of Gonorrhœa the intravenous route is the best. I have tried this drug on patients with most of the complications that are to be met with, such as arthritis, rheumatism, hyperkeratois and epididymitis. The results were remarkably good, but the effects in epididymitis was extraordinary. I have treated nearly 300 cases of this complication with SULFARSENOL, and have never failed to stop the pain in a few days, the average time in bed being 4 to 5 days. Patient previously in very great pain who had to be given morphia, slept peacefully a few hours after an injection of SULFARSENOL by an injection of 0·18 g."

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Indian Medical Gazette.

JUNE.

THE LEPROSY PROBLEM.

It is only within the last few years that the leprosy problem can be said to have come into existence in India. Formerly, leprosy was supposed to be a hereditary, incurable, loathsome disease, the mark of special disfavour of the gods for some offence committed in a former state of existence. That being so, the disease being irremediable, no problem could exist, except that of seeking some method of disposing of the poor unfortunates whom Heaven has left on our hands. This difficulty was got over in different ways with different degrees of thoroughness, from that of the Chinese monarch who had lepers buried alive, to that of the Mission to Lepers who provided them with homes and asylums where they could spend their lives with a degree of modest comfort till the fatal issue occurred. Leprosy had for years been the Cinderella of diseases, ignored even by medical men, who knew little of its early symptoms and thought of it only in its advanced stages of disfigured faces, mutilated hands and feet, and loathsome ulcers. It is little wonder that the popular conception of the disease corresponds with that of the medical profession.

Careful study of the disease has brought to light the fact that for every case which advances to this terrible condition, there are several cases in which the symptoms are quite trivial and in which no more inconvenience is ever caused than would be caused by a few patches of ring-worm; indeed there seems to be evidence that, as in the case of tuberculosis, many persons are infected who never develop the disease to a sufficient degree to be diagnosed during their life time.

The Royal Commission which was sent out to India to investigate leprosy in 1890-91 gave it as their conclusion "that there is no evidence that leprosy in India is transmitted through heredity from parent to child." Since 1892 much evidence has been brought to light to confirm this pronouncement of the Royal Commission, and we may take it that the fallacy that leprosy is a hereditary disease has been finally disposed of.

There are, however, still prevalent certain misconceptions regarding leprosy:—

1. That it is a steadily progressive disease which is invariably fatal in the long run.
2. That it is not amenable to any treatment.
3. That it is highly infectious.
4. That it is inherently loathsome and in a special way a punishment for sin.

In the majority of those who are infected with leprosy, the disease is not of itself fatal. Indeed, there is good reason to believe that its normal course is that of a self-healing disease like small-pox, enteric and other such diseases, only that whereas enteric completes its course in, say, 21 days, leprosy may take 21 years to burn itself out. As after an attack of small-pox the scars still remain, so leprosy leaves its scars in the form of depigmented patches, fibrosed nerves, paralysed and wasted muscles, contracted and shortened fingers and toes and trophic ulcers. There is reason to believe that many (though not all) of the terrible looking sores and deformities which lepers exhibit to the public to elicit alms, are no more liable to spread leprosy than pock-marked people are liable to spread small-pox or the empty orbits of the blind to spread ophthalmia. The evidence in favour of this is the failure to find lepra bacilli in such cases even after a prolonged and careful search, and the absence of all signs of progressive disease. Such cases generally die of neglect and of septic complications which could be prevented by a reasonable degree of care.

In the strictly scientific sense, few cases of the disease are curable, but in many it becomes arrested before much damage is done, and this arrest is much more likely to take place if the patients are treated on rational lines; the improvement of their general health on the same lines as are adopted with tuberculous patients will enable many cases to secure the arrest of their disease, apart altogether from special treatment. One great factor in the treatment of leprosy is the instillation of hope into the mind of the patient. Nothing is so stimulating to the body resistence as hope, nothing so depressing to vitality as despair. We have, therefore, the curious situation that suggestion is a most important factor in the treatment of leprosy. Unfortunately the suggestion that has been made to the patient in the past has been that he should "abandon all hope." For this reason it must be admitted that medical men in the past have done little but harm to their leper patients; these have asked bread, they have been given a stone. Most of the treatments of leprosy which have had any considerable vogue owe a great part of their temporary successes to the fact that leprosy often tends to get better spontaneously, and that hopeful suggestion greatly helps the tendency to cure.

The outlook for the leper is now vastly brighter than it was, thanks chiefly to the work of Sir Leonard Rogers, who combines a genius for research with a marvellous aptitude for business.

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The story of the discovery of sodium gynocardate, of the ethyl esters of chaulmoogra oil and of the other substances which are used in the treatment of leprosy is familiar to all our readers.

The present position is that the majority of cases of leprosy which have been treated by these modern methods have shown great improvement, and in many cases they have been "cured" in the popular sense. There is still room for doubt as to the share of credit which should be attributed to the special treatment and the share which is due to suggestion and to the improvement in the patient's hygienic conditions which usually accompanies the treatment. It will take a long time to arrive at a definite decision on this point, but it appears to be established that the modern treatment does exercise a very favourable influence on patients, especially in the early stages of the disease. Exaggerated claims, such as have been seen in the press, will do no good to the cause of the anti-leprosy campaign, they will be followed by disappointment and do harm in the long run. On the other hand, it is not easy to understand the attitude of those who loudly proclaim that there is no justification for the claim that a cure for leprosy has been discovered. It is necessary to emphasize the fact that neither Sir Leonard Rogers nor any other competent scientist has claimed that a radical cure exists. What is claimed is that large numbers of lepers who are subjected to rational treatment, of which the special injections form an important part, have benefited very greatly, and that many of them are to all intents and purposes "cured." Early cases of leprosy treated in this manner usually respond in a satisfactory way. We are, therefore, justified in declaring with the greatest emphasis that it is a criminal blunder to assert that leprosy is not amenable to treatment. It is perhaps equally wrong to claim that there is a specific cure for leprosy; the truth which will prevail in the long run is that leprosy is a disease which can be very greatly benefited by treatment when intelligently and persistently carried out, the majority of early cases having a fair chance of losing all signs of active disease and remaining free from them for the rest of their lives, provided that their general health and resistance are maintained.

Another important point is that in the vast majority of cases leprosy can be diagnosed by nerve symptoms long before it is possible to find lepra bacilli and therefore, presumably, before the patient has become infectious and a danger to his associates. It follows that many of such cases need never leave their employment, provided that facilities are available in the locality for efficient treatment and advice. In this way the patient is enabled to lead a healthy life, saved from despair, shame, lack of employment and of sufficient means of subsistence, all of which tend to cause rapid exacerbation of the disease. At the same time the danger of the patient infecting others is likewise removed.

The infectiousness of leprosy has been greatly exaggerated. In any country in which the incidence of the disease remains the same over a long period of years, each victim on the average communicates the disease to one other person. Some of the patients are much more dangerous than others: if these are properly treated and reasonable precautions are taken to prevent them from spreading the disease, it is certain that the disease will rapidly diminish.

The programme to be adopted should therefore consist of:—

(1) The providing of dispensaries and facilities for early diagnosis, treatment and advice. This implies the thorough training of the medical profession with regard to leprosy.

(2) Propaganda to instruct the public in the true nature of the disease.

(3) Segregation in separate rooms of infectious cases so that they avoid contact with healthy people.

(4) The providing of colonies and hospitals for the segregation, employment and treatment of infectious patients who have not the facilities for segregating themselves in their own houses, and for all leprous patients for whom for any reason proper treatment is not available while living in their own homes.

We welcome the new Association for the Relief of Leprosy in the British Empire lately inaugurated in England and wish Sir Leonard Rogers the success which he is so amply earning in his powerful and many-sided efforts to deal with the disease.

A Mirror of Hospital Practice.

BUTYN AS A LOCAL ANÆSTHETIC IN OPHTHALMIC SURGERY.

By MAJOR R. M. DICKSON, R.A.M.C.,
Ophthalmic Specialist, Lahore Division.

MANY attempts have been made during the past twenty years or more to discover an efficient substitute for cocaine as a local anæsthetic.

In ophthalmic surgery at least, butyn appears to be more than a substitute, as it is superior to cocaine in several respects.

Butyn is a synthetic preparation of coal tar, and there are no restrictions as to its purchase.

It produces no exhilarating effects, and there is, therefore, no danger of it becoming a drug

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of addiction. The importance of this point cannot be exaggerated, as the illicit use of cocaine has become a widespread social evil, and is much more prevalent in India than is generally recognised.

Butyn is more powerful than cocaine, a smaller quantity being required. It acts more rapidly than cocaine, and its action is more prolonged. It is less toxic. There is no drying effect on the tissues. It does not dilate the pupil. It can be boiled without impairing its efficiency.

Butyn has been extensively used in America as a local anæsthetic, and for the past two years Mr. W. M. Beaumont of Bath has strongly advocated its use in ophthalmic surgery.

The fact that butyn does not deteriorate on keeping is of great value in India, where the deterioration of cocaine occurs to such an extent that it is a common experience in eye work to resort to a twenty per cent. or even stronger solution. In order to test this property of butyn, a two per cent. solution was purchased in a sufficient quantity to last throughout the hot weather in the Punjab. Ten months later this solution was in use for cataract operations, and there was no evidence whatever of deterioration.

The first instillation of butyn into the conjunctival sac produces a slight degree of hyperæmia, which is not increased by subsequent instillations. This is of no consequence in eye work as it is readily controlled by adrenalin, and in this connection I have found it an ideal anæsthetic.

METHOD OF ADMINISTRATION.

For cataract operations, iridectomy, etc., a 2 per cent. solution is required. It should be given in three instillations at intervals of two minutes, followed by two drops of adrenalin.

The operation can be performed two minutes after the last instillation.

For foreign bodies in the cornea or conjunctiva, a 1 per cent. solution is sufficient.

Tenotomy and advancement of the muscles, excision of the lachrymal sac, and operations on the lids are satisfactorily performed with infiltration with a 0.5 per cent. solution.

It must be remembered that butyn has a certain degree of toxicity, and that smaller doses are required than is the case with cocaine.

One objection raised against butyn is its excessive price as compared with cocaine. It is of little value however to compare the prices of the two drugs, on account of the rapid deterioration of cocaine. Mr. Beaumont has pointed out that the present price of butyn works out at six drops a penny of 2 per cent. solution, sufficient to do a cataract operation. Butyn can be purchased in powder form in bottles of 5 grammes or less. It is readily soluble in distilled water.

In the opinion of Dr. Mathra Dass of Moga who has performed over 68,000 cataract operations, the percentage of cases of prolapse of the iris following expression of the lens in its capsule is a criterion of the efficiency of a local anæsthetic.

It is certain that prolapse is more common after expression of the lens under deteriorated cocaine. It is satisfactory to note that prolapse following the use of butyn and adrenalin appears to be decidedly less frequent than is the case with cocaine. This point requires further investigation, and could only be established after prolonged experience with a large number of cases.

PERSONAL EXPERIENCES.

Butyn was first tried by me in eye work in September 1922. It was used in a variety of cases, and proved so satisfactory that it was determined to give the drug a thorough trial. A few months elapsed, however, before it was available in India.

I have now used butyn in over 600 cases, excluding minor operations such as foreign bodies in the cornea, of which I have had a large number.

These cases included 348 cataract operations, the great majority of which were expression of the lens in its capsule, an operation which I consider requires a more profound anæsthesia than capsulotomy.

The remainder of the series included the usual every day variety of eye operations, e.g., operations on the muscles and the lids, excision of the sac, iridectomy, etc., and a few cases of evisceration.

I have found the drug most reliable, it has never failed me in a single case, and up to the present I have found it an unqualified success in ophthalmic surgery.

In conclusion, I may add that I have never had occasion to resort to cocaine since the supply of butyn became available in India just over a year ago.

SUPERNUMERARY SPLEEN.
WITH NOTES ON A CASE OF A RARE TYPE.

By J. B. HANCE, O.B.E., M.B., B.Ch. (Cantab.), F.R.C.S.E.,
CAPTAIN, I.M.S.,
Civil Surgeon, Dera Ismail Khan.

ALEXANDER and Romanes(1) in an excellent review of this subject and its literature observe "the frequency with which the pathologist meets with accessory spleens at necropsies makes it rather remarkable that their presence is rarely noted by the operating surgeon." They proceed to quote such high authorities as Adami and Nicholls, and Sherman as to the frequency of supernumerary

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spleen post-mortem which the former authority, they say, puts at 11 per cent.

On the other hand, in standard text-books of surgery, they only found one casual mention of this abnormality "and that merely as an anatomical fact." They further quote Albrecht, of Vienna, as reporting a case in which " an enormous number of supernumerary spleens were found; in the usual situation was a normal spleen the size of a walnut, with the splenic artery and vein in their normal position. The other spleens were scattered not only in the meso-gastrium but also on the peritoneum—as for example, on the hepatic ligaments and on the convexity of the liver—there were more than 30 in Douglas' pouch." W. J. Mayo has found supernumerary spleens in the pedicle, during splenectomy for tumour, etc.

With the exception of this excellently worked out article and the authorities quoted therein, the literature of this subject does not seem to be voluminous. De Teyssieu (2) records a case in which an accessory spleen was discovered p.m. embedded in the liver of an elderly female lunatic. Linder (3) records a case in which a splenoma of a supernumerary spleen between the layers of the gastro-colic omentum was discovered by laparotomy and removed. In view of the case to be recorded, it is an interesting point that Linder's case showed a left inguinal hernia. Cases are further recorded by Jolly (4), Lamphear (5), Temoin (6) and Younge (7). Temoin's case presents the interesting feature that the supernumerary spleen simulated an intestinal growth. Sir Arthur Keith (8) states that small masses of splenic tissue (accessory spleens) are occasionally found near the hilum of the spleen. Thus the great preponderance of the literature deals with supernumerary spleens not remotely removed from the normal situation of this organ, while the following is of another type:—

A. K., Mohammadan male, aet 40, was admitted to the Civil Hospital, Dera Ismail Khan, on 27th June, 1923, for radical cure of an inguinal hernia.

About 4 years previously he had noticed the swelling after playing the local national game of "Doda" in which one man runs, and two others chase him and "tackle" him in any way they can. The game, as is evident, involves a considerable amount of exertion.

On admission the patient, who was a fine, sturdy Pathan of middle height, had an elongated swelling in the left inguinal region which formed on coughing and was reducible. The swelling protruded through the external abdominal ring but did not reach the scrotum. The ring was of normal size, taking the tip of the little finger, upon which, on the patient coughing, a marked impulse could be felt. No other abnormality could be detected.

Operation.—An incision was made in the usual situation and the aponeurosis of the external oblique divided over the inguinal canal. What appeared to be a thick-walled hernial sac was defined and opened. Free fluid escaped and pressure upon the left testicle through the towels increased this. However, a probe inserted into this "sac" passed neither up into the abdomen nor down towards the scrotum. After further blunt dissection the true hernial sac was found above and internal to the "sac" originally opened, but communicating with it in its infero-external part by a very narrow opening. In view of this unusual condition the hernial sac was widely opened at once, and was found to contain a small dark red structure, indistinctly reniform in appearance, along the convex (and infero-external) border of which, and closely connected to it, ran a white glistening cord-like structure which continued upwards through the internal abdominal ring, and, as far as could be followed by the finger, appeared to extend upwards towards the left loin.

On tracing this cord-like structure downwards, it passed through the narrow opening connecting the hernial sac (A in the diagram, fig. I) with that originally opened (B) which was much thicker walled, and traversing B, passed into a close fitting thick-walled serous lined tunnel (C), which was continuous at its lower end with an apparently normal tunica vaginalis, to end splayed out over the upper pole of an apparently normal testicle. The vas deferens (D) was normal in its normal situation behind the sac, and at the internal ring could be traced turning downwards and inwards round the deep epigastric artery in the usual way, which disposed of the first idea that one was dealing with an abnormal vas with a hæmatoma upon it. The condition was so unusual that the whole series of structures, A, B, and C, were isolated by blunt dissection and, the tunica vaginalis having been opened, was dealt with as in radical cure of hydrocele. The cord-like structure was then divided between double ligatures just above the testicle, and pulled down as far as was deemed safe through the internal abdominal ring where the procedure was repeated as high up as possible, and cord and tumour removed. Radical cure of hernia was then completed by Bassini's method and the wound closed and the patient returned to bed. Recovery was uninterrupted and the patient left hospital on the eleventh day after operation.

The tumour, on section after the operation, presented a finely trabeculated appearance—the adjective suggested itself as the only apt one at the time, before any idea had occurred to me as to the nature of the tumour —which completely disposed of the theory

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that it might be a hæmatoma of an accessory vas deferens, and it was accordingly despatched in 5 per cent. formalin, to the Central Research Institute at Kasauli for microscopic examination. The report of Captain L. A. P. Anderson, I.M.S., the Assistant Director, is as follows:—

"The tumour itself consists of a mass of lymphoid tissue partially divided up by fibrous trabeculæ running into it from the capsule. Scattered throughout the mass are denser nodules of lymphoid cells, generally in association with small blood vessels. Some of these present an appearance suggestive of early tubercles, but in any more usual situation one would say that they resembled very closely the Malpighian corpuscles of the spleen. The whole tissue bears a strong resemblance to spleen or hæmolymph gland tissue, and the possibility that the tumour may be a developmental abnormality arises. It may be remarked that an accessory spleen has been described by Rolleston as extending down into the scrotum.

"The cord-like structures consist of a stout fibrous capsule which appears to spread into and form the capsule of the main mass, with which the cord is intimately connected. The cord contains four rather large blood vessels and about six smaller vessels, and for the rest is of a delicate connective tissue stroma."

I regret that I have been unable to trace Rolleston's case.

In view of the extremely interesting suggestion made by Captain Anderson, the specimen was sent to Mr. Davies Colley at Guy's Hospital. The following is an extract from his letter in reply:—

"The solid mass in the sac is unquestionably an accessory spleen. Its histological structure is typical.

FIG. I.

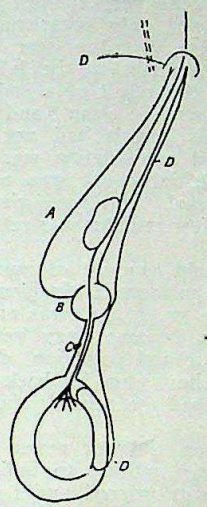


FIG. II.
After Keith.

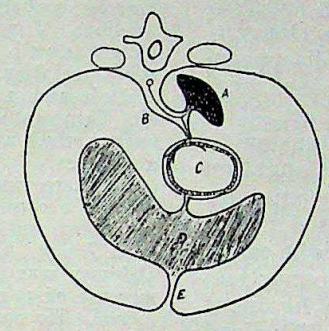
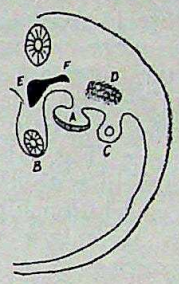


FIG. III.
After Keith.



A. Spleen.
B. Dorsal mesogastrium.
C. Stomach.
D. Liver.
E. Ventral mesogastrium.

A. Developing genital gland.
B. Gut.
C. Wolffian duct.
D. Intermediate cell mass.
E. Caudal spread of splenic tissue.
F. Hypothetical leftward spread.

"The cord-like suspensory ligament no doubt carried it down with the testicle, to which it is attached, during the latter's descent into the scrotum. I have no doubt that if it were followed to its abdominal attachment it would be found to be springing from the root of the spleen itself."

Remarks.—The nature of the tumour being thus established, it becomes of interest to enquire into the genesis of such an anomaly. As Mr. Davies Colley points out "the testis, in its original position is quite close to the spleen on the left side." Mere propinquity, however, though suggestive, does not completely account for the occurrence. It will be remembered that the spleen is developed in the dorsal mesogastrium of the embryo, appearing first as a localised growth in the mesoderm of the mesogastrium at the beginning of the sixth week of fœtal life (9). At this time, the growth of the lung buds is forcing the stomach tail-wards from its original cervical position, and it takes up its position—and with it the mesogastrium—level with the lower thoracic segments, (10). At the same time the genital ridge on the inner side of the Wolffian body, from the hinder part of which the testicle is developed, extends from the sixth to the twelfth thoracic segments, (11); the actual primitive genital gland lying in the iliac fossa.

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How, then, is the association of the spleen, which is a structure developed in the dorsal mesentery of a portion of the fore-gut, with the testicle, which develops in the mesoderm adjoining the mesentery of the mid-gut, to be explained? A possible clue is found in the statement of Colin Mackenzie quoted by Keith (12) that in lower mammals the splenic formation spreads backwards (caudal) even into the mesentery of the hind-gut, to form the "colic lobe." An atavistic persistence of this condition in the human being explains the presence of accessory spleens in Douglas' pouch in Albrecht's case—since the disappearance of the meso-rectum would leave them stranded in the situation. It is also not difficult to imagine that a localised extension to the left of this atavistic caudal prolongation of splenic tissue (Fig. III F.) might come into close relationship with the adjacent developing testicle, a relationship which might easily extend to a secondary vascular connection, the vessels acting as a suspensory ligament and assuring the migration of the localised extension. The vessels of testicular origin would be represented, in the case reported, by the cord below the tumour, and those of mesenteric origin by the same structure above it. Such is a possible, and to my mind probable, explanation of the intimate association of an accessory spleen with the testicle. An interesting feature of the case is the evidence of gallant attempts on the part of the processus vaginalis at closure, represented by the various parts of the hernial sac, tunnel, sac B, and sac A.

I am greatly indebted to Lt.-Colonel Christophers and Captain Anderson, I.M.S. and to Mr. Davies Colley for their kind and careful examinations of the specimens.

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A STRANGULATED DIAPHRAGMATIC HERNIA OF THE STOMACH.

By DR. A. BAYLEY-DE CASTRO,

Junior Medical Officer, Haddo, Port Blair.

I PUBLISH this case because of its rarity and of the obscurity of the symptoms.

Behari, a Hindu male, aged 35 years, well nourished and well developed, was admitted into the ward for free people, attached to the Convict Hospital at Haddo, on the 8th March, complaining of pain in the splenic region. He gave a history of fever of three days duration. The spleen could be palpated 1½ in. below the left costal arch. The abdomen was quite soft. Liver dullness normal. Heart sounds and precordial area normal. Right lung normal. Left lung: complete absence of inspiratory sounds up to 2 in. of the apex of the upper lobe and the very faintest of expiratory vesicular murmurs heard only occasionally along the vertebral border. There was the scar of a wound between the 5th and 6th ribs on the left side, in the anterior axillary line, the result of a stab seven years previous. Tongue normal, clean and moist. The patient stated that his bowels had not been opened for three days. Blood examination was negative for malaria and a differential count was normal. Pulse 78. Temperature normal. He was given a simple enema, which after a few minutes was returned without any fæces.

As there was a slight amount of nausea, he was ordered a carminative mixture, a sinapism applied over the spleen and quinine gr. x. b.d. was prescribed.

At 7 p.m. his pain became very severe, but the abdomen was still soft and palpation did not elicit increase of pain, also he lay on his back quite straight in bed. He again passed the remark about the bowels not acting.

A rectal examination did not reveal anything abnormal. As there was nothing to indicate intestinal trouble, a dose of oil was ordered, and ¼ gr. of morphia hypodermically at bed time.

9th March, 1924.—Morning and evening temperature normal, pulse 84, still in pain, but nothing very severe. Ordered turpentine stupes and a turpentine enema.

10th March, 1924.—Morning and evening temperature normal, pulse 84, pain still complained of in the left hypochondrium. Vomited some clear glairy fluid, which was not acid, and had no smell. Complained of nausea, and inability to pass wind. Abdomen in the same condition as before. Respirations 20 p.m., tongue clear and moist.

Former treatment stopped. Was ordered a sinapism over the pit of the stomach, ice to suck and a draught of chloral and tinct. opii. to allay the sickness. Milk and soda to be sipped in small quantities.

11th March, 1924.—Morning and evening temperature normal. Stated that he had had very little sleep. Vomited twice during the night, pain less. The liver and gall-bladder area was carefully palpated but nothing wrong was discovered. No jaundice, urine analysis normal.

Patient's face was pinched, and his expression was becoming anxious. He complained again of not passing flatus or fæces. Condition of abdomen flat and soft, tongue still clear and moist, temperature normal, pulse 120.

I may here remark that the anxious expression of the patient and the steady rise in the pulse rate were the only indications of some grave condition.

At 7 p.m. the temperature rose to 99.4, the patient had a severe attack of retching and vomiting and almost collapsed. Pulse feeble and rapid, expression very anxious.

The vomited matter was glairy and dirty in colour, vomiting did not relieve the pain. The patient was speechless, but this I think was due to fright. I again examined him, and the absence of breath sounds from the left lung I put down to an old thickened pleura, the result of pleurisy due to the wound between the 5th and 6th ribs. I must acknowledge that I did not notice or suspect the absence of the stomach from its normal anatomical site. The abdomen was still soft and doughy.

12th March, 1924.—Temperature normal, pulse 140. Expression very anxious, complaints as formerly; inability to pass flatus, nausea and vomiting persistent.

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The vomited matter was colourless but of the coffee ground type. It was not acid. The tongue was "clear, red moist, and steady" and as pain was now felt just below the xiphoid cartilage, the possibility of a gastric ulcer was thought of.

After a consultation, at which Dr. Hussey of Viper Island was present, it was decided to open the abdomen and be prepared for all eventualities, as doubt still existed as to the correct diagnosis.

Operation was performed under a general anæsthetic. An incision 3½ in. long was made in the middle line, 1 in. above the umbilicus and on entering the abdominal cavity the first thing noticed was that the vessels of the omentum and mesentery were found to be much engorged and in a condition of thrombosis, and the coils of small intestines immediately in view were congested. The omentum was thickened. The small intestines contained fæcal matter of semi-solid consistency. The duodenum was pulled upwards and to the left. The gall-bladder was next examined and found to be normal.

A search was then made for the stomach, and now for the first time it was noticed to be absent from the abdominal cavity.

This search occupied quite a long time because of the adhesions that had to be broken down all around, but finally, following up the duodenum, it was discovered to lead to the left thoracic cavity through an opening in the diaphragm.

The original incision was now enlarged upwards to the xiphoid, and from the lower end horizontally across the left of the abdomen to the level of the costal arch, thus forming a triangular flap, which, on being reflected upwards and outwards, exposed to view the whole of the herniated area.

The opening in the diaphragm was an inch to the left of the left crux and 2½ in. in front in the nipple line, and was a little bigger than a rupee in size. This wound was undoubtedly caused by the stab 7 years previous. The lower lobe of the left lung had completely collapsed, the result of pressure caused by the stomach. The stomach had prolapsed through this opening into the left thoracic cavity up to about an inch from the pyloric end. With gentle but firm traction it was at last got down. The gastro-epiploica dextra and senestra vessels and their branches were engorged, and the stomach itself was covered with dark subserous hæmorrhagic patches scattered all over. The pyloric end was darkly congested, there was a hæmorrhagic patch about 1½ in. in circumference at the fundus of the greater curvature, resection however was not called for. The rent in the diaphragm was now sutured, but before this was finished the patient began to sink, energetic restorative measures had to be adopted, with unfortunately futile results, and a fatal issue.

CLINICAL NOTES ON SOME INTERESTING CASES OF DIFFICULT LABOUR.

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Surgeon to His Excellency the Governor of Bombay.

(Continued from *I. M. G.*, May 1924, p. 244.)

Case III. Ventro-fixation necessitating Cæsarean Section. R., a Hindu woman of 35, was admitted in labour at 10-15 p.m. on November 3rd, 1917. She was now pregnant for the tenth time. A complete history of all her previous pregnancies was difficult to obtain, but the salient points in these were as follows:—

Her first pregnancy ended in a premature labour at the seventh month; the second labour was normal and a live child was born. Then followed a series of four abortions at about the third month. These abortions appear to have been the result of a retroversion of the uterus, because after the fourth abortion an abdominal operation was performed and the uterus "stitched up." The pregnancy which followed this operation resulted in a live full-time child but it was complicated by some difficulty in the delivery of the placenta and there was considerable post-partum hæmorrhage. Then followed two more deliveries at term with no difficulty except with the afterbirth, the separation and expulsion of which was accompanied by severe hæmorrhage.

When admitted for the confinement now to be described, the patient's general condition was good. Her pulse rate was 80 per minute, the temperature was 97°F., there was a history of the membranes having ruptured six hours previously, and she was experiencing strong pains at intervals of about twenty minutes. Inspection of the abdomen revealed an operation scar extending from the umbilicus to just above the symphysis pubis. There was an ovoid swelling with its long axis oblique, the lower pole occupying the left iliac fossa and its upper extremity lying beneath the right lower ribs. The child was firmly embraced by the uterus so that its various parts could not be identified by palpation. The fœtal heart was heard a little below and to the right of the umbilicus and its rate was about 130 per minute.

On vaginal examination only the anterior edge of external os could be reached, it was situated high up and posteriorly on a level with the sacral promontory, so that the external os was directed almost directly backwards.

In front of the backwardly directed os uteri, the sensation imparted to the examining hand was that of a soft thick mass of tissue, but no portion of the fœtus could be identified. It was therefore obvious that one had to deal with a case of anterior sacculation of the uterus secondary to a previous ventro-fixation operation, and since the cervix could not be reached, the condition constituted an absolute indication for Cæsarean section.

On opening the abdomen a thick band was seen about 1 in. long stretching from the anterior surface of the uterus to the anterior abdominal wall and situated about 3 in. above the symphysis pubis. The uterus was opened and a full-time child, weighing 6½ lbs., was extracted without difficulty. In order to facilitate the suturing of the uterus, an attempt was made to bring the emptied organ outside the abdominal cavity; this, however, was found to be impossible and the uterine sutures had to be passed with the organ in situ. The impossibility of delivering the uterus outside the abdomen I attributed to the fact that only

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a portion of the uterine wall had become stretched *pari passu* with the growth of the fœtus, viz., that portion of the anterior uterine wall situated above the ventro-fixation band, the fundus and its posterior wall, whilst that portion of the anterior wall of the uterus extending from below the fixation band to the internal os could only be capable of being stretched to a very limited extent. In other words, the posterior uterine wall was the segment of the uterus which had undergone most stretching in order to accommodate the child.

In the case under consideration the malpresentation must have added to the degree of stretching of the posterior uterine wall, and doubtless, had the case been left to nature. rupture of the posterior part of the lower uterine segment would have been the inevitable result.

Having realized that increase in the capacity of the uterus had taken place mostly at the expense of its posterior wall, it is easy to understand that as soon as the organ was emptied, its much over-stretched posterior wall retracted to such an extent as to prevent the organ from being delivered outside the abdomen.

The patient made an uninterrupted recovery, and both mother and infant were discharged from hospital quite well on December 1st, 1917.

Ventro-suspension properly performed very rarely leads to dystocia, and most women who have had this operation performed according to modern methods pass through their confinements in a perfectly normal manner. It is even questionable, I think, whether it is wise to warn such patients that there is a possibility of difficulty arising in a subsequent confinement. Not very long ago I attended an officer's wife on whom ventro-suspension had been performed by a well known gynæcologist; this lady had somehow acquired the knowledge that Cæsarean section is sometimes necessary after the uterus has been thus supported, and I cannot help thinking that this knowledge acted quite otherwise than as a tonic to her nervous system. Her confinement was uneventful in its normality, the only artificial aid given being chloroform during the latter part of the second stage. It is another matter when the uterus is firmly fixed to the anterior abdominal wall over a considerable area, and especially when this fixation is carried out too near the fundus uteri.

Case IV. Placenta prævia and Cæsarean section. One meets with only a few cases of placenta prævia in which the condition of both mother and child justifies the operation of Cæsarean section. This is more especially so in hospital practice where such patients are usually admitted in a more or less advanced stage of labour and only after there has been a considerable loss of blood, a state of affairs which would obviously contra-indicate a major operation when other means of delivery are open to us.

In recent years it has been recognised that the best treatment for certain cases of placenta prævia is Cæsarean section, and the results obtained among these carefully selected cases have been very satisfactory both as regards the maternal mortality and that of the infants. The maternal mortality of placenta prævia treated on the ordinary lines is 4 to 8 per cent., and the average fœtal mortality is 60 per cent. Munro Kerr says: "The best figures give 4 per cent., and 35 per cent. respectively, and they are as low as one can ever expect to reach with the present recognised methods of treatment." But in certain cases of placenta prævia, such as the one described below, Cæsarean section would, I think, justify us in expecting much better results.

As regards the mother, there seems no special reason why Cæsarean section performed in suitable cases of placenta prævia should not yield quite as good results as it does in cases of contracted pelvis, when the operation is performed under the best conditions, the maternal mortality then being 2.9 per cent. (Amand Routh). Berkeley and Bonney place the maternal death-rate of Cæsarean section, when this operation is performed under the best conditions, as "probably under 1 per cent." In well-selected cases of placenta prævia the maternal mortality should not, therefore, be greater than about 2 per cent., i.e., about half as great as we could expect from any other method of treatment. One other great advantage to the mother is a lesser risk of morbidity as compared with that which results from the necessary manipulations, often prolonged, which accompany delivery *per vias naturales.*

The fœtal mortality must obviously be very greatly reduced by Cæsarean section, and the rate of 35 per cent. at the best would be reduced to one of about 5 per cent. Further, in most cases the mother should be as well able to nurse her infant as after normal delivery, a result which, because of some slight sepsis or as the result of hæmorrhage before and during delivery, is often denied to the mother who has been otherwise delivered.

Generally speaking, the operation of Cæsarean section in a case of placenta prævia is indicated under the following conditions: (1) when the hæmorrhage has not been excessive and the maternal pulse is full and its rate not above 100 per minute; (2) when the cervix is undilated and appears to be unduly rigid, indicating that dilatation is likely to be slow and difficult, as is often the case in elderly

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primiparæ; (3) when the surgeon can be confident that there is no risk of sepsis from previous frequent vaginal examinations, etc.; (4) the pregnancy should have reached full term or very nearly so, and the fœtal heart sounds must be good; (5) another factor which should influence the surgeon in deciding in favour of Cæsarean section is the co-existence of some disproportion between the size of the fœtal head and the maternal pelvis; and (6), as in the case here described, when the parents are especially desirous of a live child. The following case will serve to illustrate these points:—

The patient, an Anglo-Indian, aged 32, was admitted under my care to the maternity department of the Sassoon Hospital, Poona, on October 19th, 1915. She had been married 12 years and the present was her first pregnancy. The last period ended on January 11th, 1915; the probable date of confinement would be about October 16th, 1915. The patient stated that she had had slight pains for about 36 hours; bleeding began a few hours before she came to hospital. No vaginal examination had been made previous to her admission to hospital. When I saw her she was having feeble pains at about half-hourly intervals. Her general condition was excellent, the pulse being full and its rate 80 per minute; the face was placid and the tongue clean and moist. On abdominal examination the child was found to be in the first vertex position and the fœtal heart sounds were good. The pelvic measurements were normal.

On vaginal examination there was still a definite and fairly firm cervix, which admitted one finger only; at the internal os only placental tissue could be reached.

Both the patient and her husband were very desirous of having a live child, and considering all the points of her case, I felt justified in advising abdominal section. Cæsarean section was therefore performed and a full-time live child was delivered. The bleeding from the placental site was somewhat excessive and for a moment rather disconcerting; it was certainly more than I had noted in cases of Cæsarean section in which the placenta was normally implanted. During the first few days after the operation there was a good deal of trouble from after-pains; otherwise the patient made an uneventful recovery, and both mother and child were discharged quite well on November 27th.

Case V. Eclampsia; Cæsarean section. R., a Parsi, giving her age as 16, but who appeared to be 20, was admitted under my care at 7-50 a.m. on the 1st July, 1919.

She was unconscious, her face was cyanosed and puffy and her breathing was stertorous; the temperature was 100.6°F., the pulse-rate was 140 per minute, and occasionally a beat was missed. The history obtained from her relatives was to the effect that she had been married for 8 months, and that she had been quite well up to the day before admission. On that day at about 4 p.m. she complained of headache and this was followed by an attack of vomiting. At 7 p.m. there was a fit, and from that time up to her admission many other fits occurred, the exact number I could not obtain. Some of these convulsions were followed by unconsciousness for varying periods. Eight more convulsions followed from the time after admission to hospital until I was able to operate four hours later. There was no swelling of the feet or vulva, but the eyelids were œdematous and the face was a little puffy. The urine was smoky and on boiling was solid with albumen. An injection of morphia gr. ¼ with atropine gr. 1|150 was given at 8-30 a.m.; this suppressed the fits for a time, but then followed a very severe convulsion and others at intervals but not so severe. Abdominal examination showed the patient to be about 6½ months pregnant; the fœtal heart was not heard, but auscultation was difficult because of the stertorous breathing. *Per vaginam*, the cervix only admitted the tip of the finger.

As to whether the fœtus was alive or not was here of no moment; it was a question entirely of saving the mother's life. Her condition was obviously a desperate one, and one which fully justified the most radical treatment. My own opinion, after a not inconsiderable experience in this class of case, is that any dallying with morphia and saline treatment is waste of valuable time; the best treatment consists in the rapid emptying of the uterus by appropriate surgical measures, and when the cervix is not dilated the best operation is some form of Cæsarean section, either vaginal or abdominal.

In this case I selected the abdominal method, because the vagina was small and undilated. The anæsthetic used was CE_2; a recently dead male fœtus of about seven months' gestation was extracted without any difficulty, and after suturing the uterine incision, the abdominal wall was sewn up in layers. An injection of 1 c.c. of pituitrin was given during the operation.

As soon as the patient was returned to bed a pint of sodium bicarbonate solution, of a strength of one drachm to the pint, was administered per rectum; in smaller amounts this was repeated until recovery was well established. Six hours after the operation the patient was drowsy and semi-conscious, but no more convulsions had occurred; her pulse was now 110 per minute and much better than before the operation. Next day there was an obvious improvement in her general condition, although the urine was still solid with albumen on boiling. Sodium

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bicarbonate solution was administered rectally every four hours, and as much water as possible was given by the mouth.

On July 3rd, she was able to take milk and barley water every three hours. She was passing a large amount of pale urine, which now contained much less albumen. There was some distress from cough, the result of a bronchitis, which, however, did not last many days. By July 9th, she was well on the road to recovery. I had intended to remove the stitches on this day; in this I was almost forestalled by the patient, who feeling an itching sensation about the wound proceeded to remove the wool and gauze from beneath the binder and then dug her not very clean nails along the suture line. Accidents of this kind are not infrequent in surgical practice in the East and the most careful nursing can hardly cater for this. The sutures were removed and the wound, which luckily was only superficial, was cleaned with an antiseptic solution. On July 12th, there was still a very slight trace of albumen in the urine; and on August 3rd the abdominal wound having healed soundly, and there being no albuminuria, the patient was discharged.

Case VI. Small round pelvis—Dystocia, Cæsarean section. Mrs. I., an Englishwoman, aged 37, first consulted me on the 19th February, 1919; she was then pregnant for the second time. Her first confinement took place in March 1918; the history of this event shows it to have been a long and tedious process. According to the patient a period of 4 days elapsed from the commencement of labour pains until the birth of the child, which was accomplished without forceps or other assistance. The child was asphyxiated at birth, which it only survived a few hours; she remembered that there were marks on the baby's head and she also stated that it coughed up blood.

Abdominal palpation showed the patient to be about eight months pregnant and the child to be lying in the 4th vertex position. The fœtal head was freely movable above the brim of the pelvis. It was considered that March 12th, 1919, would be the probable date of her confinement.

The one thing which struck me about this patient was her small stature, her height being only 4 feet 8½ inches. Her pelvic measurements were as follows:—The interspinous measurement amounted to 8 in., the intercristal was 10 in., the external conjugate 7¼ in., whilst the diagonal conjugate measured 4 in. to 4¼ in.

On the 10th March, 1919, labour commenced with a "show" at 10-30 a.m. and pains began a little later. The child was lying with its long axis vertical with the vertex presenting in the first position; the os admitted 2 fingers. Considering the history of her first labour, the general smallness of the pelvic measurements, her small stature and the fact that the fœtal head was freely movable above the brim and could not be pressed into the brim, I advised Cæsarean section as being the safest measure not only for the child, but also for the mother. The patient however refused operation. Fourteen hours later the os was found to be three quarters dilated and the membranes bulging into the vagina. There had been strong pains throughout the day, but despite this the head was still movable above the brim and there had been no advance. Consent was now given to operate. Cæsarean section was performed and a live male child delivered. The patient was able to nurse her child and both did well. This case shows how important it is to carefully measure the pelvis in every first labour; had this been done in this case much suffering would have been prevented and possibly a life saved perhaps by the timely application of forceps or more certainly by Cæsarean section. If delivery by forceps was impracticable, craniotomy should have been performed in the interest of the mother.

ON A NON-OPERATIVE TREATMENT FOR HERNIA.

By DR. S. MALLANNAH, M.D.,

Chemical Examiner and Bacteriologist, H. E. H. the Nizam's Government, Hyderabad, Deccan.

HERNIA being very common in India,—according to Dr. Mallannah's figures indeed it affects some 12 per cent. of adult males and some 25 per cent. of elderly Indian males,—and patients being in dread of operative procedures and anæsthetics, any successful non-operative form of treatment is of interest. A truss often fails to cure and is merely palliative; indeed in the long run it weakens the muscles and this may enlarge the ring, so that the hernia becomes larger with age. Of various medicinal treatments advocated, Heaton advocated applications of white oak bark, Pancoast an application of strong ammonia to produce local inflammation and adhesions. The mortality from operative procedures is about 3 per cent. (Coley), and the failure rate some 5 per cent.

Unsutured wounds of the skin heal by granulation tissue formation, and the author accordingly considered the possibility of inducing some similar process in the mouth of the hernial sac. A vaccine was prepared of *B. pyocyaneus*, of strength 1 c.c. = 100 millions; and a suitable case presented himself in the form of an adult Indian male with an inguinal hernia. The hernia was reduced and 1 c.c. of the vaccine injected into the internal abdominal ring. Cure followed.

Technique.—The author's technique is as follows:—"After getting the lower part of the abdomen and the scrotum shaved, the skin is painted with tincture of iodine. After reducing the hernia I introduce my left forefinger, having painted it with tincture of iodine, into the internal abdominal ring after having passed the external abdominal ring and the canal. When I am satisfied that the finger is in the internal abdominal ring, I keep it there straight and not bent, and with my right hand I introduce the needle alongside my left forefinger which forms a guide, into the internal abdominal ring, keeping the needle quite parallel to the finger. I then inject the fluid just inside the internal abdominal ring and after withdrawing the

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needle, I withdraw my left forefinger, and not till then. Or one of the assistants can pass his finger and the operator can inject the fluid by passing the needle alongside his finger. There are three points which ought not to be forgotten in this technique. 1. The finger introduced must remain straight and not be kept bent. 2. The needle should be introduced quite parallel to the finger. 3. The finger should be withdrawn after the needle is removed. A purgative is administered a day before treatment and complete rest is enforced for 10 days. The use of the bed-pan and of glycerine enemata is essential during this period. The injection is followed by a reactionary fever, the temperature rising to 100 to 102°F, but being usually normal next morning. There is also usually slight tenderness over the part for a few days."

In addition to his own cases, the author records reports of the successful use of the method by Drs. J. C. Dutt, Moran, Assam; B. V. Suriyanarayana, Kodmur; and V. S. Jagannathan, Poona; all in cases of inguinal hernia.—(*Abstract from original communication.*)

ON A NEW TREATMENT FOR TUBERCULOSIS.

By RAI DR. B. GHOSH BAHADUR,
Hazaribagh.

THE multiplicity of different remedies advocated for tuberculosis in all its forms merely proves the relative uselessness of most of them. For the past ten years the author has been experimenting with injections of a solution of formalin and ether, with a view to utilising the bactericidal action of the former, and the fat-dissolving action of the latter drug. The solution used is a one-half per cent. solution of commerical formalin in spiritus aetheris sulphatis, a dose of one-half a c.c. being given intravenously every alternate day until the temperature becomes normal, the night sweats stop, and the cough lessens. After this the injections are given twice a week until, on repeated examinations, no tubercle bacilli can be found in the sputum.

The author claims that in early cases 20 injections will bring about rapid amelioration, whilst 40 injections will cure the majority of cases.

The following are some of the cases recorded by the author:—

Case 1.—Hindu female, aged 24, with phthisis of at least 14 months' duration, accompanied by attacks of profuse hæmoptysis.

Tubercle bacilli present in the sputum. Cavitation at the apex of the right lung and scattered consolidated areas in both lungs. Minute doses of tuberculin and intravenous therapy with sodium morrhuate were first tried without success. On the formalin-ether injections the condition apparently cleared up in three months; but later relapsed, as the patient discontinued treatment against advice. The treatment was re-instituted, and at the sixth month from commencing treatment she was apparently well. The sputum showed no tubercle bacilli on repeated examination, and the only physical sign left was dullness at the apices. The patient was reported to be in good health a year after the cessation of treatment.

Case 2.—European male, aged 16, with a marked family history of phthisis, his father having died of phthisis and his sister being an invalid from tubercular hip disease. Apices of both lungs involved, tubercle bacilli present in the sputum, fever to 102 to 104°F., and profuse night sweats. Sodium morrhuate injections having failed to relieve the condition, and diarrhœa having ensued and proved troublesome to treat, the formalin-ether injections were resorted to. In seven weeks the temperature became steadily normal, there was but very slight cough, and no tubercle bacilli could be detected in the sputum. At the end of six months the patient's weight had increased from 71 lbs. to 105 lbs., no tubercle bacilli could be found in the sputum, and there were no physical signs of phthisis. The von Pirquet test gave a negative result, and two years after the cessation of treatment the patient was reported to be in excellent health.

Case 3.—A Hindu male student with laryngeal tuberculosis, with multiple small ulcers scattered over the posterior part of the epiglottis. Examination of the sputum shewed the presence of tubercle bacilli. In addition to the intravenous injections of formalin-ether, he was given cod-liver oil and iron orally, and local applications of iodine and carbolic acid. At the end of six months the voice had regained its normal tone and there was no trace of throat trouble. The ulcers had disappeared; the injections were continued for one more month, and the patient was later reported to be in excellent health.

Case 4.—Hindu male, aged 13, with tabes mesenterica. Had been in a hill station with prolonged treatment by tuberculin without improvement. When first seen was a chronic invalid. Thickened masses could be palpated in the abdomen, and there was diarrhœa with fever. No tubercle bacilli could be detected in the sputum, but the von Pirquet test gave a positive result, as also did Morro's test. The patient made an uninterrupted recovery, and two years after the cessation of treatment was reported to be in good health.

Case 5.—Mahomedan female, aged 30, with hæmoptysis, fever rising to 103°F., and profuse night sweats. Tubercle bacilli not detected in the sputum, but marked physical signs of a large cavity at the apex of the right lung, and moist râles over both lungs. After 10 injections, the patient had put on 5 lbs. in weight, was able to walk about, and after 14 injections decided to discontinue treatment as she considered herself cured, despite advice to the contrary. Not traced subsequently.

Case 6.—Hindu male, aged 28, police constable with two years' history of phthisis. Tubercle bacilli present in the sputum and signs of infection at the apex of the left lung. After 9 injections had markedly improved, but was then transferred to another district and has not been heard from since.

Case 7.—Hindu female, aged 25, with a fistula-in-ano of two years' duration. Operation followed six months later by recurrence, and area opened and curetted; caseous masses removed. After an attempt at healing, inflammation recurred; treated by intravenous iodine and local dressings. Put on to treatment with intravenous formalin-ether; had completely recovered after 14 injections. Not heard from since.

The author appeals for further trial of the method. Details of other cases are not sufficient to warrant publication, but the treatment appears to have encouraging results.—(*Abstract from original communication.*)

ON THE USE OF ADRENALIN IN WHITE ASPHYXIA OF THE NEWLY BORN.

By CAPT. N. N. GHOSH, M.B.,
Serajganj.

THE author was in attendance on the confinement of a Mrs. A., a multipara. The child was born in white asphyxia, with the skin cold, with no sign of respiration, but with the heart still beating. The usual remedies were tried,—dipping into hot water, clearing the throat and nose, Schultz's method of artificial respiration, and slapping the back. Finally continuous artificial respiration was begun; but the case appeared to be hopeless.

The author now gave an intra-cardiac injection of half a c.c. of liquor adrenalin, 1 in 1,000 (P. D. and Co.), the injection being given into the musculature of the left ventricle above the site of the apex-beat. Artificial respiration was continued. The heart beats immediately became quicker and more audible. Fifteen minutes later the child gave a gasp, and shortly afterwards began to breath spontaneously. It was wrapped in cotton wool and carefully tended; but the next day

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pneumonia set in, with a water-logged condition of the lungs, and death followed. It is doubtful whether this could in any measure be attributed to the use of adrenalin, as the delivery had occurred in the usual filthy surroundings of an Indian *busti*.

The author suggests that intra-cardiac injections of adrenalin may be worth trial in such cases: they cannot do harm, and may save the child's life. He further comments on a curious indigenous custom of frying the placenta on a frying pan, after its delivery, and whilst it is still attached to the child:—a custom which he has seen carried out in two cases. Apparently the popular idea is that in such cases,—if the frying placenta be kept at a lower level than that of the child,—heated blood may pass from it to the child and may stimulate respiration! (*Abstract from original communication.*)

SPECIAL ARTICLE.

THE PROVISION OF WHOLE TIME DISTRICT HEALTH PERSONNEL IN THE UNITED PROVINCES.

By C. N. DUNN, D.P.H.,
LT.-COL., I.M.S.,
Director of Public Health, United Provinces.

ON taking over the appointment of Director of Public Health, United Provinces, I was struck with the inadequacy of the provisions made for improving rural sanitation and for dealing with the various epidemics which annually visit these Provinces.

After a careful enquiry into the matter, I came to the conclusion that the only epidemic disease against which anything like adequate provision had been made in the past is small-pox. For dealing with this disease a fairly adequate organisation has existed for some considerable time in the shape of the civil surgeons in their capacity of district superintendents of vaccination, the assistant district superintendents of vaccination and one vaccinator for each vaccination circle. The result of the provision of an adequate staff to deal with this disease has been that epidemics of small-pox are now few and far between, and no epidemic that has taken place in recent years has caused more deaths in one year than 1,439.

In the case of plague and cholera the contrast is striking. The average number of deaths occurring annually from plague during the last ten years has been 71,243 and from cholera 59,823.

With regard to malaria it is well known that, owing to the reporting agency being the village chowkidar, it has been practically impossible to arrive at even an approximate estimate of the numbers of deaths annually due to this disease. The death rate is grossly exaggerated, and deaths from all kinds of acute and chronic respiratory diseases, with various intestinal complaints and other fevers, are attributed to malaria. There is no doubt, however, that malaria, owing to its debilitating effects, is a predisposing cause to deaths from other diseases.

In the larger municipalities, medical officers of health and sanitary inspectors have been provided under rules laid down by the local government for some years, and these public health staffs have been able to reduce enormously the death rate from the above epidemic diseases. They have not been able to effect much improvement in the general death rate, as with the best will in the world, no medical officer of health can produce any effect on the general death rate of a town when money is lacking to spend on reconstruction in these towns, thus abolishing the extremely unhealthy housing conditions which now exist in the crowded mohallas of all Indian cities.

In the districts, statistics, such as they are, tend to prove that the general death rate, excluding the epidemic death rate, is much lower than in towns; as the inhabitants of the villages, although living in unhygienic surroundings from many points of view, are not exposed to the greatest of all the disadvantages of living in towns in India, *i.e.*, gross overcrowding. It is therefore obvious that efforts to control epidemics in villages are certain to have a beneficial effect on the general death rate in rural areas.

Until quite recently the only organisation at the disposal of district authorities to deal with epidemics consisted of the civil surgeon and the vaccination staff, and they, under the control of the Director of Public Health and his Assistant Directors, did what they could to combat outbreaks of plague, cholera, etc. The district magistrate also gave all the assistance he could through the revenue establishment. With such an inadequate organisation working under many disadvantages, it is not surprising that very little amelioration in the prevailing conditions during epidemics has resulted. In many districts in the United Provinces, the civil surgeon is fully employed in the work of curing disease, in carrying out his duties as superintendent of the district jail and in medico-legal work, and in some districts this work is so heavy that the civil surgeon is debarred from touring in his district. The assistance rendered by the district magistrate and his revenue establishment varied according to the personal interest which that officer took in the supression of epidemics. Some district officers applied their energies to this purpose with, in some cases, excellent results, while others, owing to the lack of personal interest and the multifarious nature of their other duties, obtained very poor results.

It therefore became obvious to me that the only method by which better results in dealing with epidemics could be obtained would be by the appointment of whole time personnel to deal with the prevention of disease, both endemic and epidemic. I proposed to government that qualified district medical officers of health with a minimum subordinate staff should be appointed to carry out these duties, thus relieving the civil surgeon of his duties as district sanitary officer and as district superintendent of vaccination, duties to which he was not able to devote anything like the necessary amount of time. I did not propose that such officers should be appointed in every district in the province at once, as it would be impossible to provide the necessary qualified personnel for all districts.

In order to provide this personnel gradually, I proposed that a beginning should be made by training medical officers of health and sanitary inspectors to fill the new appointments and obtained the sanction of government to the institution of classes at the Lucknow Medical College to train these officers.

Classes for a Diploma of Public Health to be conferred on doctors with a registrable qualification in the United Kingdom by the State Board of Medical Examinations were started. Classes were also started to confer a Licence in Public Health under the auspices of the same body on sub-assistant surgeons, whilst the number of sanitary inspectors being trained in the classes already in existence under government auspices was largely increased, in order to provide sanitary inspectors for district as well as for municipal work. These classes have now been in existence for three years and many candidates have qualified for the Public Health Service. The classes for the Diploma of Public Health were, after the first year, taken over by Lucknow University, who now confer this Diploma, the courses of instruction for which are in accordance with the new standard laid down by the General Medical Council in the United Kingdom, the course being one extending over 18 months. The standard for the Licence in Public Health is based on the old standard in force in England, the course being one of nine months' duration.

The courses for sanitary inspectors consist of two courses of four months each in the prevention of disease, sanitation and hygiene, and minor sanitary engineering, respectively.

These courses, therefore, provide the necessary qualified personnel for employment in public health work.

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A scheme was then proposed to government for the appointment of district health staffs in three districts of these provinces as a beginning; the staff in each district proposed was one district medical officer of health with a Lucknow University Diploma of Public Health, one assistant medical officer of health with a Lucknow Licence in Public Health, and one sanitary inspector with a sanitary inspector's certificate for each tahsil in each district.

The districts chosen were Basti and Gorakpur, the Gorakpur district being considered to be equal to two districts for the purposes of this scheme, owing to its population being more than double the average population of a district. These districts were also chosen, as they are districts which are annually ravaged with severe epidemics of cholera and plague.

The health staffs in these districts were appointed in June 1922, and they have been, therefore, at work for nearly two years. The arrangement in these districts was that the District Boards should find half the salaries of this personnel, and should, in addition, provide the necessary clerical and menial establishment from their own resources, together with other contingent expenses such as travelling allowance, carriage of tents, stationery, etc.

In April, 1923, the district of Azamgarh was added to the scheme, this being a large district south of Gorakpur, which is also annually ravaged by plague and cholera. In the case of Azamgarh, owing to financial stringency in the board, the whole cost of the scheme was promised by government for one year, in order to give the board a demonstration of its benefits to the general public health. In the case of Basti and Gorakpur after one year's experience of the working of the scheme, the district boards were asked by government to make the scheme permanent and to come to terms with government as to what proportion of the expense they were prepared to bear. As a result of this, a final arrangement has now been come to in these districts under which government are prepared to finance 2|3rds of the cost of the scheme, while the district boards are prepared to pay for 1|3rd.

At present the district boards are required to appoint qualified personnel only from the approved lists of each class of public health officers maintained in the office of the Director of Public Health and are required to pay this personnel the scale of pay laid down by government.

The scale for a district medical officer of health is the same as that for a second class municipality, *viz.*, Rs. 350 per mensem; rising by biennial increments of Rs. 50 to a maximum of Rs. 700. For an assistant medical officer of health, the scale is the same as that laid down for a medical officer of health of a third class municipality, *viz.*, Rs. 200 per mensem, rising by biennial increments of Rs. 20 to Rs. 400. For a sanitary inspector, the scale laid down for sanitary inspectors in municipalities, *viz.*, Rs. 70 per mensem, rising by annual increments of Rs. 3 to Rs. 100.

In addition to the above personnel, the whole of the vaccination staff is under the orders of the district medical officer of health, who is required to train the vaccinators in anti-epidemic duties, and use them for combating any epidemic which may arise. The qualifications required for newly appointed vaccinators are that they should have passed the VII Class examination, so that being literate, they can be adequately instructed in their duties.

In each district under the district health scheme, at least one provincial travelling dispensary is placed at the disposal of the district medical officer of health. In the above districts, being large, there are two in each. These public health travelling dispensaries are in the charge of sub-assistant surgeons who have taken the Licence in Public Health.

The above public health personnel is considered by me the absolute minimum from which we may expect results in any way commensurate with the expenditure. It is not considered a sufficient personnel, but it is hoped that district boards will be so impressed with the benefits accruing to the health of the community, that they will be willing in the future to gradually increase the staff and thus obtain further far-reaching benefits from their employment.

The duties of a district medical officer of health are as follows:—

1. The district medical officer of health will be in charge of the public health of the district or sub-district to which posted, excluding municipalities which have a municipal medical officer of health, and cantonments. He will be under the general control of the Director of Public Health and under the immediate direction and orders of the district board. He will tour in the district, inspecting and supervising the work of the assistant medical officer of health and the sanitary inspectors under him. He should freely confer with the chairman of the district board on the various subjects connected with his work in order to keep him in touch with the matters of importance.

2. Sanitation.

When inspecting the sanitation of town areas, notified areas and villages, he should examine each aspect of the public health conditions mentioned below and make recommendations to the district board with care and fore-thought.

(1) Site.
(2) (*a*) Surface cleanliness.
(*b*) Collection and disposal of rubbish and night-soil.
(3) Drainage and drainage outfall (with the possibility of a sewage farm).
(4) Water supply.
(5) (*a*) Sub-soil water level and direction of flow.
(*b*) Pools and depressions within the area and half a mile radius of inhabited area.
(*c*) Character of crops grown in this area whether by irrigation, by gravity or by lift.
(*d*) Varieties of anopheles larvæ and fish found.
(6) Markets, bazaars, slaughter houses and food supply.
(7) Housing in relation to rats and plague, over-crowding.
(8) Any other interesting feature bearing upon sanitation.
(9) Income and expenditure with special reference to expenditure on sanitation.

3. Inspection of vaccination.

He should exercise a close personal supervision of vaccination in his district. This is very necessary, as vaccinators, unless closely supervised, resort to many devices to show large returns on paper and do little work. This results in an increasingly large unvaccinated population growing up, which will inevitably result in a return of the scourge of small-pox in epidemic form. The inspection of vaccination in villages and hamlets away from main roads should receive special attention.

When checking vaccinators' returns for the discovery of fictitious entries, strict enquiries should be made from the *mukhias* and *dhais* whether the name of the absentee is known in the village, and if known, whether a child of the age reported was really born in the family during the period under report.

4. Inspection of registration of births and deaths and collection of vital statistics.

This is notoriously defective, and, therefore, requires constant checking in order to materially reduce errors in reporting. In reporting errors found in birth and death registers, the details of place, name, father's name, caste, date, etc., should be given.

5. Inspection of schools, especially middle and primary schools.

In inspecting schools, he should devote attention to the sanitation of the building and the site and also inspect the scholars and make recommendations to the educational authorities for improving their health.

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6. Religious gatherings and fairs.

The supervision of the sanitation and health of all religious gatherings and fairs in the district are an important part of his duties.

7. Supervision and constant inspection of all the travelling dispensaries.

8. Hygiene publicity propaganda.

He should direct and control the propaganda with a view to gradually educating the people as a whole to understand the value of personal and communal hygiene, and to acquaint them with the simple rules for avoiding epidemic and endemic diseases. He should personally give lectures in towns and villages to all classes of the community illustrated by magic lanterns and slides provided by the Provincial Hygiene Bureau. He should distribute the posters and pamphlets published by the bureau on the subjects dealt with under its organisation.

This is one of the most important portions of his duty, as no permanent advance in the prevention of the disease in rural areas can be expected unless a demand for better hygienic conditions is created by the people.

9. Epidemics.

His most important duty of all is to organise campaigns against the great epidemic diseases, especially cholera and plague. It is only by the provision of an expert organisation to deal with these diseases that a permanent diminution in their ravages may be expected.

From the three districts in which the scheme has been introduced, reports on the work done have been received and in each the work has, in my opinion and in that of the Assistant Director of Public Health, IV Range, been conscientiously carried out. In all three districts several primary outbreaks of cholera have occurred, but owing to the prompt action by the district health staffs, in no single case has a general epidemic supervened. This is a great contrast to what occurred in previous years, when owing to faulty notice of primary outbreaks and the lateness of the action taken by the district authorities, severe epidemics of cholera have occurred annually. The average numbers of deaths from cholera during the five years, previous to the introduction of the scheme, were as follows:—

Gorakpur	9,731.2
Basti	5,634.6
Azamgarh	2,963.2

While the numbers of deaths from cholera in the year following the introduction of the scheme are as follows:—

Gorakpur	56
Basti	27
Azamgarh	112

In the case of plague the figures for the same periods are as follows:—

Gorakpur	7,166.6	and 9,515
Basti	4,658.4	„ 9,883
Azamgarh	7,654.2	„ 4,464

The same diminution in the number of deaths from plague was not expected as in the case of cholera, owing to the great difficulty in getting the people to carry out the measures for escaping from this disease. Also there has been a general recrudescence of plague in the United Provinces during the last two seasons after a long period of mild epidemics. However, the district health staffs applied themselves strenuously to obtaining the evacuation of infected villages and a large number of inoculations were carried out with the result that epidemics of this disease were greatly limited.

With regard to small-pox, a few isolated epidemics occurred which were controlled, and large numbers of vaccinations were inspected by the district health staffs.

With regard to malaria, owing to the activities of the district health staffs, much anti-malarial work was done, and villages and landowners were, in many cases, induced to carry out small anti-malarial measures without any expense to the district boards whatever.

General Sanitation.—The sanitation of all notified areas, town areas, and villages under the Village Sanitation Act, was inspected with the result among others that the water supply from wells was in general much improved.

In the Gorakpur and Basti districts during the year ending 31st March, 1923, 1,477 and 419 villages, respectively, were visited in connection with the Hygiene Publicity Campaign.

School Inspection.—In the Gorakpur and Basti districts 185 and 30 schools were inspected, and all scholars were examined for contagious and infectious diseases. A large number of cases of trachoma and ring-worm were detected and suitable treatment recommended.

The district medical officers of health of these districts have submitted lengthy and detailed reports of their work since their appointments, and from a careful perusal of these reports it appears that much amelioration in the existing conditions has resulted, the total death rates have been largely reduced, as has also the infantile mortality, the malaria death rate and especially the cholera death rate. In all districts the number of inoculations against plague has been doubled or trebled, the numbers of inspections of vaccination have been largely increased and the numbers of inspections of vital statistics are also far more than in any previous years.

Owing to financial stringency, the extension of the scheme to other districts has been retarded, but it is hoped that it will be possible to extend the scheme to four more districts in the near future.

I consider that the success of the scheme is due to the fact that the public health personnel appointed are qualified officers who have taken up public health as a career, and who are, therefore, personally interested in the results obtained from their work. In the past, temporary assistant surgeons and sub-assistant surgeons who were employed on anti-epidemic duty had but little interest in their work owing to the absence of any prospects as the result thereof, and whose chief ambition was to get an appointment in the medical department as medical officer in charge of a dispensary. It is therefore to be hoped that there will be no reversion to the system which loaded the civil surgeon with a large amount of work which he had neither the time nor as a rule the training to carry out, but that each district in time will be provided with a qualified and energetic staff of public health officers whose prospects will depend entirely on their own efforts to prove their value to the community.

With regard to cost, the following figures may be of interest:—

(*a*) *Gorakpur District.* (*Six tahsils*).—Two district medical officers of health, with a staff of two assistant district medical officers, five sanitary inspectors, two clerks, four peons, travelling allowances and contingencies—Rs. 27,708 per annum.

(*b*) *Basti District.* (*Five tahsils*).—One district medical officer of health, with a staff of one assistant district medical officer, three sanitary inspectors, one clerk and three peons, with travelling allowances, contingencies, etc.—Rs. 18,000 per annum.

(*c*) *Azamgarh District.* (*Six tahsils*).—One district medical officer of health, with a staff of one assistant district medical officer, six sanitary inspectors, one clerk, two peons, with travelling allowances, contingencies, etc.—Rs. 17,514 per annum.

Current Topics.

The Care and Treatment of Sick Lascars in London.

WITH a fine appreciation of the value to the Empire of the work done by lascars on board the great steamers

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which link India with England, Mr. Singhanee of Poona has, from his fortune, devoted a lakh of rupees for the care of lascars who may fall ill when in the Port of London. This money is being administered by the Seamen's Hospital Society which has thereby been enabled to erect and equip at their hospital at Tilbury Docks a new wing to be used exclusively for the care and treatment of sick lascars. In a strange land, whose climate is unsuited to their physical nature, this ward will be to misfortunate lascars a haven of refuge at a time when they most need consolation.

In addition to the above mentioned hospital at Tilbury, the Seamen's Hospital Society administers three other hospitals in the metropolis, a sanatorium for tubercular diseases in Hampshire and a convalescent home on the Kentish downs. The mother institution, the "Dreadnought" Hospital, Greenwich, has accommodation for 235 patients. In the past 8 years a substantial sum has been collected which in the immediate future is to provide a new nurses' home and other extensions which will bring this building into the front rank in the matter of up to date equipment. From here a motor ambulance is sent to fetch from his ship any seaman seriously ill, the moment she comes along side the quay.

In the centre of the Victoria and the Albert Docks, there is a small hospital of fifty beds which, owing to its position, is of immense value in admitting patients who are dangerously ill when their ship comes to the docks.

At the Hospital for Tropical Diseases in Endsleigh Gardens maladies of this special nature receive expert treatment at the hands of physicians who have specialised in tropical medicine. In the same building is the London School of Tropical Medicine which is affiliated to the Seamen's Hospital Society. The work of this School in London and the research expeditions sent under its auspices to many tropical districts is well known to all doctors and students of tropical medicine.

Phthisis is a disease which attacks the lascars of India with particular persistence and the King George's Sanatorium for Sailors at Bramshott Place on the summit of the Hindhead hills is an ideal place in which to pursue to long treatment which the cure of this disease demands.

The sea is no respecter of persons and disease and accidents are common incidents in a seafaring life. It is therefore hoped that those who sympathise with the white man who works side by side with the lascar on the Indian routes will come forward in an equally generous spirit to that displayed by Mr. Singhanee and help the Seaman's Hospital Society to give the very best medical and surgical aid to all mariners in affliction.

The Seamen's Hospital Society is honoured by the confidence which Mr. Singhanee has shewn in the Corporation by allowing them to administer his munificent gift.

Every seaman—of whatsoever race or nationality—who comes to the Port of London suffering from any serious disease, falls under the care of this Society. The more extended this confidence, an expression of which takes the form of donations to the funds of the Corporation, the greater the effort made to deserve the trust placed in the Society.

The "Field" Distemper Fund.

MEDICAL men interested in the diseases due to filtrable viruses will welcome the inauguration of organised effort in England to solve the mysterious problems of canine distemper; a disease perhaps even more prevalent in India than in England. The solution of such problems may throw a flood of light on several human diseases, apart from its humanitarian and veterinary value.

The Fund has already reached the total of £4,257, and its administration is in the hands of a very strong council, which includes such eminent statesmen as Lord Goschen and such eminent research workers as Sir W. Leishman, A.M.S. and Professor C. J. Martin. Work has already been started in earnest, and the following extracts from the first research report by Sir William Leishman will interest many of our readers.

"The Research Committee have been actively engaged in making preparations for new scientific studies of this disease, its causation, and the possibilities of its cure or prevention. Their work up to this stage has been under the following heads :

1. *Survey of Existing Knowledge and the Scientific Methods Hitherto Employed.*—In the past 50 years many workers in different countries have studied the subject, and their published work has been critically examined by the Committee. Omitting here all details of this, it may be said that many good observers have described a bacillus, easily visible under the microscope, as commonly found in distempered dogs, and have looked on it as the cause of the disease. Others, again, have regarded the bacilli so found as secondary invaders, because, perhaps, of many of the complications and sequelæ, or possibly of the fatality of the disease, but the primary infection they consider to be due to some hitherto unrecognised agent. Thus Carré believes that his experimental results definitely show that the disease is caused by an invisible virus so small as to be able to pass through a porcelain filter.

Carré carried out a number of experiments in which young puppies were employed. He found that if the nasal secretion of an animal in the early stages of distemper was diluted, filtered through porcelain so as to free it from all ordinary bacteria, and then injected subcutaneously in sufficient quantity, the disease was constantly reproduced and could be transmitted through a long series of animals. The dogs infected with filtered nasal secretion showed all the characteristic symptoms of the various forms of the disease. He further found that these animals, if they recovered, were immune against further attacks. He found that the blood was infective only in the very early stages—in fact, just after the onset of fever, that is to say, at a time when it is free from ordinary bacteria. These experiments were repeated on several occasions and gave quite constant results. They were considered by Carré, however, to be only preliminary to further work.

The reasons that have led most veterinary surgeons and pathologists to favour the views formulated by Carré, rather than those held by Ferry, Copeman, McGowan, and others, namely, that the disease is due to a bacillus, may be summed up as follows:—

(*i*) Most investigators have been unable to reproduce the complete clinical picture of the disease by means of these bacilli.

(*ii*) The employment of vaccines made from the recognisable bacilli have proved of little use in protecting dogs against attacks of the disease.

That an organism is found in a very large percentage of the cases is no absolute proof that it is the casual agent of a disease, for it has long been recognised that a particular bacillus may be a regular though accidental complication of a specific fever.

2. *Visits to Foreign Centres of Research.*—Three members of the Committee, Professor Hodbay, Mr. Buxton and Capt. Douglas have visited Antwerp, Rotterdam, Utrecht, Brussels and Paris, and at Paris had the advantage of full discussion with Messieurs Carré and Vallée at Alfort.

The workers of these countries are, in general, inclined to the view that the bacilli are complicating and secondary organisms, while the true cause of the disease is a filtrable and invisible virus.

3. *Proposed Scheme of Investigations.*—On consideration of the work of previous investigators, it seems evident that the research now proposed should be begun almost *de novo*, and that the value of the earlier experimental findings should be re-examined.

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The preliminary material for the purpose will be supplied by specially reared puppies which have been permitted to contract distemper by contact with dogs suffering from a natural infection. An attempt will be made to isolate from these animals organisms such as those which have been already described by earlier workers and the invisible virus recorded by Carré. The significance as causes of the disease of any organisms so obtained will be determined by experimental methods on specially reared susceptible puppies.

Carré's experiments consisted principally in the subcutaneous injection into susceptible puppies of bacteria-free filtrates of various secretions, etc., obtained from dogs suffering from distemper, and the careful observation of the experimental animal for any early symptoms which might denote the presence of the disease before the secondary and more obvious symptoms were manifest.

In the event of the presence of a filter-passing virus, such as that obtained by Carré, being established, a whole new field of research is immediately opened up. Briefly this may be summarised as follows:—

(*a*) The research for the virus by modern optical methods.

(*b*) The determination of its resistance to temperature, light, moisture, antiseptics, etc.

(*c*) Attempts to cultivate the virus artificially.

(*d*) The study of immunity, natural and acquired, in animals.

(*e*) The study of complications and sequelæ of distemper, their cause, and their preventive treatment.

Whatever may be the ultimate success in discovering and defining the essential cause of distemper, it is certain that much useful knowledge will be acquired about the propagation and method of spread of the disease, and a very serious attempt will be made by the investigators to discover more satisfactory methods for the prevention and control of canine distemper.

4. *Particular Methods Proposed.*—It is evident that the proper study of the ætiology of canine distemper can only be undertaken by employing animals in which the disease occurs under natural conditions—namely, dogs. Further, the dogs must be susceptible to infection, and the chance of the animals becoming spontaneously infected must be eliminated. As was pointed out by Ferry, previous workers did not appear to have mentioned the adoption of any special precautions in the protection of their experimental animals from accidental infection before their inoculations or during subsequent treatment. The vast majority of young dogs are susceptible to the disease, but if the animals are purchased or bred in the ordinary manner there is always the possibility that some may have contracted a mild form of the disease unnoticed, and may thus have developed an unsuspected immunity. The presence of even a few such animals in an experimental stock would make the investigation inconclusive, and therefore useless. The precautions adopted by Ferry, although apparently very much in advance of those of previous workers, leave much to be desired.

The breeding of suitable puppies is regarded as the most important preliminary step in the investigation. For this purpose it is proposed to build a compound in an isolated spot on the experimental farm of the Medical Research Council.

In order that there may be no delay, it is proposed to carry out preliminary experiments, during the time occupied by the erection of these buildings and the breeding of the special stock, in temporary structures which are now rapidly nearing completion. In the first instance puppies will be used which will have been bred and reared in a manner similar to that adopted by Ferry. Healthy pregnant bitches will be purchased, and after a suitable period of observation will be placed in a special breeding room. The puppies will be taken away as soon as weaned, suitably cleaned, and passed through a series of observation rooms. Animals so reared will be used for the preliminary investigations, but for the principal experiments greater care will be taken to ensure their entire freedom from an acquired immunity.

5. *Supplementary Schemes of Research or Inquiry.*—While the Research Committee are planning centralised research work of the kind just indicated they have under careful consideration all the numerous proposals for work at other places and offers of scientific help which have come from many sources. They hope to avail themselves freely of these at the right time and as opportunities occur. Under this head may be mentioned the collection of data of the incidence in time and locality of distemper outbreaks, for which the Committee may soon ask special assistance."

It will be seen in the above report that a well planned campaign is ahead, and that it may yield results of considerable medical as well as of veterinary value.

The Council and the editor of *The Field*, further appeal to dog-lovers the world over for financial assistance. The address of the Fund is Windsor House, Bream's Buildings, London, E. C. 4.

The Control of Malaria.

By MALCOLM WATSON, M.D. (Klang), F.M.S.

Jour. Trop. Med. and Hygiene, Jan. 1, 1924, p. 6.

BEFORE Sir Ronald Ross's epoch-making discovery malaria was, and had been for hundreds of years, a dark inscrutable mystery. Ross's genius changed darkness to light. Dr. Watson briefly gives two instances of what has been done in the Malay Peninsula in the past twenty years under different physical conditions; the places are within three degrees of the Equator, have a rainfall round about 100 inches a year spread throughout the year, and the country as a whole is naturally covered by an ever-green damp jungle, whilst mosquitoes exist in myriads at all times. One example is of malaria on low-lying land; the other of malaria on hill land.

Twenty years ago or less, if the tropical sanitarian had been asked what was the class of land least likely ever to be freed from malarial by the control of mosquitoes (or any other means for that matter) he would unhesitatingly have named the low-lying coastal land with high ground water, heavy clay soil, liable to flooding from the sea. Such land had ever been known to be pestilential almost beyond description; it had given rise to innumerable speculations on the cause of malaria—the decay of coral, the mixing of fresh and salt water, to name but two. In every part of the tropical world instances of the deadly power of malaria in coastal regions could be given. In the Malay Peninsula and Archipelago, for example, the Governor, Sir Frank Swettenham, in 1901 ordered the new port called after himself to be closed, so overpowering was the malaria. On the opposite side of the Straits of Malacca, the Port of Belawan in Sumatra was so malarial that the Dutch left it every night, retired to a town some twenty miles inland, to return by the first train the following morning. Many other examples could be given.

Carey Island is situated on the coastal belt of such land. It is indeed an island just above sea-level in its highest parts, and obviously has been formed by the alluvium from the hills. Surrounded by water, on one side by the sea, on others by large rivers or riverine estuaries, containing salt water, it was fringed by mangrove swamps and covered by dense virgin jungle. Throughout its length and breadth it was swamp, either of fresh water or salt.

In 1906, a pioneer planter of Malaya, the late Mr. E. V. Carey, took up a concession of 30,000 acres on the island and began the planting or rubber and coconuts. The land was bunded and drained. Tide gates were necessary. Enough was known of the control of malaria to enable the labour to be kept free from malaria from the first, and opening rapidly proceeded. To-day some 14,000 acres (or roughly 20 square miles) are under cultivation. No European—of a population of from twenty to thirty—has contracted malaria on

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the island since 1912. In 1922, the average Asiatic population was 4,344. There were twenty-six cases of malaria, fourteen clinical cases, and twelve in which parasites were found. This is a rate of six per mille. The lowest rate recorded in Panama was fourteen per mille.

The death-rate of the labour force in 1922 was 8.2 per mille. This freedom from malaria has been achieved by good drainage and by the selection of suitable sites for buildings. It costs the estate practically nothing; while the absence of malaria makes the estate one of the cheapest producers of both rubber and coconuts in the East. This is an example of the control of malaria carried by two species of anopheles—namely, *Anopheles umbrosus and A. ludlowi.*

Even in small rural areas malaria has been controlled at a cost well within the reach of a commercial undertaking; indeed, the money spent has been recovered within a short period by the improved labour and a lowered cost of production.

The City of Singapore.—Following the control of malaria in the coastal regions, a new and apparently even more difficult problem confronted Dr. Watson—namely, malaria on hill land. In the ravines or valleys, when under jungle, malaria was carried by *A. umbrosus;* when the jungle was swept away, when, for stagnant swamps in the valleys, swift clean running streams were substituted, malaria was of even greater intensity, in many places death claiming over 300 out of every 1,000 of the population per annum. The mosquito carrier which lived in these streams was *A. maculatus.*

Excellent work has been done in the city of Singapore. Prior to 1911 a malaria wave swept over the city almost every year. It generally reached its maximum in the month of May. In 1911, Dr. Watson was asked to advise the Anti-malaria Committee, and drew up plans for the control of malaria in a selected area.

Indeed Singapore has now ceased to be malarial, as far as the troops are concerned. The area under mosquito control is almost six square miles. There are 8¾ miles of concrete channels and 31 miles of subsoil drainage. A sum of approximately $350,000 (say £38,000 sterling) has been spent on capital and maintenance accounts. This year there is a vote of $100,000 (say £12,000) for maintenance and extension of anti-malarial and general anti-mosquito work.

Following the anti-malaria work, the spleen rate of the children fell progressively from about 50 to zero.

	Per 1,000
The peak of the malarial wave in May averaged for the ten years 1903 to 1912 ..	53.76
The peak of the malarial wave in May averaged for the ten years 1913 to 1922 ..	33.73
A reduction of	16.49
The average annual death-rate from all causes was for the ten years 1903 to 1922 ..	44.11
The average annual death-rate from all causes was for the ten years 1913 to 1922 ..	33.73
A reduction of	10.38
The average population 1913 to 1922 was	312,763
The saving of life is therefore	32,214

The saving of life is from all medical and sanitary measures, but the most important of these measures is the control of mosquitoes.

Finally, Dr. Watson adds that in the 25 years since Sir Ronald Ross's discovery, over 100,000 lives have been saved in Malaya alone, owing to that discovery; and the work is just beginning.

Sprue and Cœliac Disease.

Brit. Med. Jour., Dec. 15, 1923, pp. 1150.

AT a meeting of the Sections of Tropical Diseases and Parasitology of the Royal Society of Medicine on December 3rd a discussion took place on sprue and cœliac disease.

Sir Leonard Rogers, in opening, said that a large number of theories with regard to any particular disease indicated that we were ignorant of its real nature; that was especially true with regard to the causation of sprue—a group of symptoms which might be produced by several ætiological factors, the essential factor being still unknown. The various theories might be divided into two groups; those suggesting digestive changes, and the infective theories. Of the latter the most important was that which ascribed sprue to the action of the yeast group of fungi. *Monilia psilosis* had also been suggested. It was probable, however, that yeast fungi were merely an aggravating secondary infection. Organisms of the group *Streptococcus viridans* had been identified, and good results had been obtained from the use of oral streptococcal vaccines. The great loss of colour in the stools lent weight to the theory of digestive deficiency, there being an excess of fat in the stools. In order to discover the originating factor of the disease it was necessary to study the early stages. Sir Patrick Manson had stated twenty predisposing causes, from long endemic residence to fistula and miscarriages. Hill-diarrhœa in India was a very important predisposing cause which threw great light on the subject, as the digestive changes in that disease had a suggestive similarity to sprue, and neglected hill-diarrhœa very often developed into sprue. Hill-diarrhœa was not infective, and would immediately cease upon removing the patient to a lower level. There was strong evidence for the belief that deficiency in vitamins was a predisposing cause of sprue, a diet of tomatoes and marmite giving good results, although marmite was an extract of yeast, the very fungus which was supposed to cause sprue. Vaccines had been used with a certain measure of success. Extraordinarily rapid recoveries had resulted from treatment on the theory of calcium deficiency.

Dr. A. Castellani said that infections by monilia and streptococcus were secondary. He had never had the slightest result from the use of monilia vaccines. He did not agree with the theory that sprue originated in syphilis. He had never found santonin treatment successful; alkaline treatment was certainly useful.

Dr. H. H. Scott read a paper on the nature and treatment of sprue, by parathyroid extract and calcium lactate, previously reviewed in our columns.

Dr. Arthur Powell emphasized the differences between cœliac disease and sprue. In sprue *post-mortem* examination invariably revealed a shrinkage of the liver, great attenuation of the stomach, with loss of epithelium; these conditions were not observed in cœliac disease, which was characterized by enlarged spleen and great pain in the abdomen. Vomiting was more frequent in cœliac disease than sprue. In cœliac disease the appetite was poor and capricious, whereas, unfortunately, in sprue it was the opposite. There was a tendency to dropsy in cœliac disease, while there was shrinkage of the body in sprue. In sprue he had known the pancreas to show the symptoms of syphilis.

Dr. Low said he had known cases of sprue—if it were sprue—in which the disease had developed ten years after the patient had returned to England. The curing of the septic condition of the mouth had been extremely beneficial, although he believed the effect was secondary. It was extremely difficult to know when a permanent cure had been effected.

Sir Leonard Rogers, in summing up, said that he thought sprue might be due to the fact that vitamins were not properly digested, and not to any lack in the diet.

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Kangri-Burn Cancer.

By ERNEST F. NEVE, M.D., C.M., F.R.C.S. (Edin.),
Surgeon, Mission Hospital, Kashmir.
Brit. Med. Jour., Dec. 29, 1923, pp. 1255.

THE following extracts from Dr. Neve's paper will be of interest:—

Since the year 1881, operations for epithelioma performed in the Kashmir Mission Hospital have numbered 2,491; of these approximately 2,000, or 84 per cent., were for kangri cancer. The kangri is an earthenware bowl five or six inches in diameter, surrounded by basket-work and surmounted by a wicker handle. It is heated by means of wood-charcoal, and is worn, by the poorer class of Kashmiris, against the skin, under a single loose garment not unlike a smock-frock. The primary factor in the causation of kangri cancer is, doubtless, heat, but it is possible that the volatile substances resulting from the combustion of the wood play a secondary part. The seats of election of the growths are the inner sides of the thighs and the anterior surface of the abdomen above or below the umbilicus. The disease is considerably commoner in men than in women, probably owing to the less continuous use of the kangri by the latter in their mostly domestic occupations. The average age for the onset of the cancer is 55; in a few cases it occurred before the age of 40, and in 7 per cent. of the cases over the age of 70. Many elderly Kashmiris show a great tendency to localized superficial overgrowth of the epithelium; small, slightly scaly, pigmented patches or papules may be found scattered over the entire surface of the body. Owing to the constant application of heat the skin of the thighs and abdomen often appears dry and horny, the course of the superficial veins is marked out by a brown discolouration, and every degree of chronic dermatitis may be met with, from a mere redness, with or without desquamation, to thickened patches, warty projections, or horny outgrowths from the surface. Scars, resulting from previous kangri burns, are frequent, and are apt to undergo a malignant change.

Kangri-burn cancer is never found on the back or on the extensor surface of the limbs. It may be single or multiple, and the skin around it usually shows scarring. In the early stages ulceration is absent, and the growth consists of a mere horny or warty thickening, beneath which an epithelial infiltration is demonstrable microscopically. The cancer is met with in three forms, the commonest of which consists of a circular or oval ulcer about an inch and a half in diameter, with deep crater-like centre and raised edges. In some cases part of the tumour is fungating and the rest deeply excavated.

The average duration of life in kangri-burn cancer is about fifteen months; in about 10 per cent. of the cases, from one to five years; and, as an exceptional event, as long as twenty years. The malignancy varies. As a rule a small growth, if superficial, is slow to grow and still slower in infecting the glands. There are, however, striking exceptions, and at times a slowly growing tumour will suddenly show a rapid increase. More than 50 per cent. of the cases show secondary infection of the glands when first seen.

[We hope shortly to publish an illustrated article by Dr. Neve on this important subject.—ED., *Indian Medical Gazette.*]

Reviews.

THE ANATOMY AND PHYSIOLOGY OF THE MALE BODY. By Hubert E. J. Biss, M.A., M.D., Cantab., D.P.H. Plates by M. Dupuy, M.D. Third Edition. London: Baillière, Tindall and Cox, 1924. Pp. 27. Price, 6s. net. Plates 8.

THIS popular atlas of the human body will be useful to junior medical students, and also to those members of the lay public who are interested in physical culture, hygiene and artistic anatomy. The plates are well produced.

GERIATRICS. By M. W. Thewlis, M.D. 2nd Edition. Pp. 401. Price, $4.50. St. Louis: C. V. Mosby Co. 1924.

IN most respects, the old command a degree of attention which is out of proportion to their value to society and so it is rather surprising that there should be many books on pediatrics and hardly any on geriatrics.

We venture to assert that the majority of medical men do not know the meaning of the word geriatrics and perhaps the author would have been well advised to give his book a more familiar name. The need for a book on the special aspects of disease in the old is obvious. Dr. Thewlis is one of the few physicians who has made a thorough study of the subject and he has made a serious effort to place geriatrics on as sound a basis as pediatrics.

Old age, like most diseases, is more easy to prevent than to cure, and this aspect of the subject is fully dealt with in the book under review.

INFLAMMATION IN BONES AND JOINTS. By Leonard W. Ely, M.D., Associate Professor of Surgery, Stanford University, Philadelphia and London: J. B. Lippincott Co. Obtainable in India from Messrs. Butterworth & Co. (India), Ltd., P. O. Box 251, Calcutta. Pp. 433, with 144 illustrations. Price, 30s. net.

THIS book is not an exhaustive treatise on the diseases of bones and joints, in fact it contains little that is not to be found in any of the moderate sized works on surgery which are in common use amongst students. The chapters on diseases of the bones are decidedly sketchy and we find no adequate description of the microscopical anatomy of inflammatory changes in bone, acute or chronic, though there is an abundance of micro-photographs which, excellent though they are in their way, never convey as clear an impression to a student as a well executed drawing. The chapters on the joints are more satisfactory, the clinical descriptions are good and the methods of treatment adequately dealt with, though the author's views on the treatment of spinal tuberculosis indicate a faith in the efficacy of Albee's and Hibb's operations which is not shared by all orthopædic surgeons. The trend of modern surgical opinion is in favour of restricting these operations to adult cases and only employing them in children, when for some reason conservative treatment is not practicable; many of the reported "successes" in America have had subsequently to be classed as "relapses."

In the chapter on rickets a brief reference is made to an "error in diet," but there is no account of the work of Chick, Mellanby and others on the nature of this "error." Transtrochanteric osteotomy of the femur is an admirable operation, which surely deserves mention along with linear osteotomy of the neck and cuneiform subtrochanteric osteotomy.

The division of arthritis into two great types, one type being osteo-arthritis with new bone formation and the other including all other varieties of chronic arthritis, is ingenious, but does not appear to serve any particularly useful purpose. In a footnote the author records the finding of *Entamœba histolytica* in the bone marrow of a case of osteo-arthritis and expresses a hope of thus clearing up the mystery of this disease. The book is well printed and illustrated.

THE AMBULATORY TREATMENT OF FRACTURES AND DISEASED JOINTS. By Carel A. Hoefitcke. With an introduction by Frank Romer, M.R.C.S. London: William Heinemann, 1923. Pp. 273, with 261 illustrations. Price, 17s. 6d. net.

THIS is not a book by a medical man, but by a maker of a pattern of splint, which is a modification of

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Hessing's. Our readers will no doubt be familiar with the appliance from the advertisements which have for long appeared in the medical journals. The apparatus works on the same principle as the Thomas' caliper splint, which allows of walking by carrying the weight of the body on the tuber ischii. In addition there is an arrangement for applying extension by means of an accurately fitting anklet. The introductory chapters deal with the principles on which the splint depends and furnish descriptions of its construction and application. Following these come a series of extracts from papers in medical journals, personal letters from surgeons and practitioners, some distinguished some undistinguished, and a mass of records of successful cases, arranged on no systematic plan and unaccompanied by any statistical tables of results.

For the treatment of ununited fractures and for the post-operative treatment of certain fractures, the principles on which this splint depends are universally accepted. So too in osteo-arthritis, it is now recognised that movement and correction of deformity by surgical means is an essential part of the treatment. When it comes however to forcible correction of the deformity in acute joint tuberculosis, we are on more debatable ground. The author corrects deformity at one sitting on an ingenious extension table of his own invention, puts the limb up in plaster and then fits his apparatus with extension, claiming that the separation of the joint surfaces allows use of the joint without pain. From his case records it would appear that most of his cases are of a chronic type. The majority of the most experienced orthopædic surgeons are opposed to ambulatory treatment in acute cases, though we must not forget the success of Willems' ambulatory treatment of acute suppurative arthritis, also on lines opposed to all authority. The reader must choose for himself, the method should be thoroughly tried, but it is hampered by the expense of the apparatus, which puts it out of reach of all but wealthy patients.

It remains to add that Mr. Hoeffteke has worked always with the medical profession and is not one of these who claim to offer an alternative form of treatment.

LECTURES ON ENDOCRINOLOGY. By Walter Timme, M.D. New York: Paul B. Hoeber. Pp. 123. Price, $1.50.

THIS little booklet is an unchanged reprint of an article which appeared in the *Neurological Bulletin* for January, 1921. It gives in a condensed form a good idea of the functions of the endocrine glands.

HANDBOOK OF PHARMACOLOGY INCLUDING MATERIA MEDICA By Birendra Nath Ghosh, F.R.F.P.S. (Glas.). First Edition. Calcutta: Hilton and Co., 1923. Pp. 396. Price, Rs. 4.

DR. B. N. GHOSH, who is well known in this country as the joint editor of Rakhal Das Ghosh's "Materia Medica," has brought out a small handbook of pharmacology including materia medica, which has been sent to us for review. The author says in the preface that the volume is intended for students studying for different licentiate diplomas, and therefore all unnecessary detail has been left out. The arrangement followed is in the main that of Ghosh's "Materia Medica," though the classification of drugs is somewhat different. Preliminary reference to the physiology of the organs on which the drug produces its actions will undoubtedly help the student to a better understanding of the pharmacological action of the drugs. The descriptions of the actions of remedies are necessarily concise, but they are none the less accurate and lucid and there is hardly any important point which has been omitted. The book, one has no doubt, will prove to be of very great assistance to students preparing for examinations.

MATERIA MEDICA, PHARMACY, PHARMACOLOGY AND THERAPEUTICS. By William Hale-White, K.B.E., M.D. (Lond.), M.D. (Dub.), Hon. Col., R.A.M.C. (T). 18th Edition. J. & A. Churchhill, 1924. Pp. 712. Price, 10s. 6d. net.

THE *Text-Book of Materia Medica* by Sir W. Hale-White is one of the best known, well established and standard books on the subject. The eighteenth edition which has just been sent to us for review has several useful additions and alterations which brings the book quite up to date. We cordially welcome the new edition of this popular book which we are sure will be appreciated by students and practitioners.

A TEXT-BOOK OF THERAPEUTICS, INCLUDING THE ESSENTIALS OF PHARMACOLOGY AND MATERIA MEDICA. By A. A. Stevens, A.M., M.D. 6th Edition. Philadelphia and London: W. B. Saunders Co., 1923. Pp. 793. Price, 30s. net.

THE sixth edition of this well known book has been entirely revised, enlarged and rearranged and is a great improvement on the fifth edition which appeared in 1916. The author's arrangement of dealing with the pharmacological action of the remedies first and then going on to their application in the treatment of disease is very helpful. Owing to the limited space at the author's disposal and the large ground which has been covered, some of the descriptions of the actions of drugs have been necessarily brief, even in case of some of the important drugs. But the book on the whole is excellent from the practitioner's point of view, who does not desire to go too deeply into the experimental side. The part dealing with applied therapeutics could not be better. This book is not very well known in this country and we wish to bring it to the notice of senior students and practitioners, who cannot have a better reference book.

TAYLOR'S SANITARY INSPECTOR'S HANDBOOK. 6th Edition. Edited by John H. Clarke. London: H. K. Lewis & Co., Ltd., 1924. Pp. 540 + xii. 116 illustrations. Price, 12s. 6d. net.

THIS is a new edition of a well known text-book, largely rewritten by J. H. Clarke, M.R.S.I., Chief Sanitary Inspector, Chiswick. The book is much improved and has many new illustrations. It is a very necessary *vade mecum* for Sanitary Inspectors in England for whom it is specially written. Local conditions and public health law in the tropics differ so greatly from those of England that the book has but a relative value for the health officer or student in India.

CLINICAL DIAGNOSIS BY LABORATORY METHODS. By J. C. Todd, M.D., Professor of Clinical Pathology, School of Medicine, University of Colorado. 5th, 1923, Edition Philadelphia and London: W. B. Saunders Co. Pp. 762, with 325 Illustrations. Price, 28s. net.

TODD'S *Clinical Diagnosis* is, or should be, well known to laboratory workers, for it is an admirable book; well printed, profusely and beautifully illustrated, and most ably written. In the fifth edition the work has been entirely revised and much of it re-written. Special attention has been given to errors in technique and faulty manipulations of the microscope,—causes which are more responsible than any others for the difficulties and mistakes of students. In the new edition the additional matter includes the examination of the duodenal contents, the tests for acidosis, and the most recent methods of blood chemistry. Sections have been added upon Rosenthal's phenol-tetra-chlor-phthalein test for liver function, the flocculation test for syphilis, the permutite method for ammonia in the urine, methods for bilirubin in the blood, the colorimetric method of adjusting the reaction of culture media, the

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classification of streptococci, and methods of typing pneumococci, whilst many chapters have been re-written, especially that on sero-diagnostic methods.

Whilst, however, the new edition thus contains completely up-to-date information,—especially in its biochemical methods,—the old is better than ever. Twenty-nine colour plates are included, and of special value, are the colour plates dealing with normal and abnormal blood cells; these indeed being some of the best that we have seen anywhere. The microphotographs of the ova of intestinal helminths are of special value; and are very clear and striking; indeed the microphotographs throughout the book are one of its special features.

The laboratory worker will find in this manual a mine of information, well printed, very freely illustrated, and well indexed for reference.

PRINCIPLES OF VITAL STATISTICS. By I. S. Falk, Ph.D. Yale University, Philadelphia and London: W. B. Saunders Co., Ltd. 1923. Pp. 258. Price, 12s. 6d. net.

THIS small volume is an essay for the practising physician and health worker rather than a text-book for the public health student. As it deals with American statistical data which are differently recorded from those of England, the book is not adapted for teaching in India or England.

It is interesting to find that a very large proportion of the states have not yet come into the federal registration association for births and deaths. Also one reads that the American calculates intercensal populations in terms of arithmetical progression, and the author claims that this is more accurate than the English Registrar General's or logarithmic method of calculating increase by geometrical progression: a statement which one finds hard to accept.

Corrigendum.—With reference to the review on p. 264 of our May number of Dr. Krause's "Aids to Physiology," we have received a letter from Messrs. Baillière, Tindall & Cox,—the publishers,—asking us to state that the 2nd, 1924, edition is the work solely of Dr. R. A. Krause. Professor J. Tait, M.D., collaborated in the first edition, but not in the second edition. Messrs. Baillière, Tindall & Cox's letter was unfortunately not received until the May number was already out.—ED., *Indian Medical Gazette.*

Annual Report.

ADMINISTRATION REPORT OF THE JAILS OF THE BENGAL PRESIDENCY FOR 1922. By LT.-COL. W. G. HAMILTON, I.M.S., CALCUTTA: BENGAL SECRETARIAT BOOK DEPOT, 1923. PRICE Rs. 5-14.

THE year 1922 was a most difficult one in the history of the prisons in Bengal. Owing to the non-co-operation movement a large number of "political" prisoners were admitted, and a special temporary camp jail was erected at Kidderpore; whilst provision for extra prisoners was provided, but not utilised, in the European Ward of the Mental Hospital at Berhampur; this ward being vacant, would have afforded a particularly suitable site of internment for such female non-co-operators as elected to go to jail. As a result of the movement the total number of prisoners admitted during the year was 84,985 as against 83,366 in 1921.

The movement as regards the jails indeed culminated in the two riots at the Presidency General Jail on the 26th of April and the 1st of October. On the first occasion, a Mohammedan convict having been assaulted by a warder, it was alleged that this had taken place whilst he was at prayers. A mob of some 300 to 400 prisoners attacked the warders and the superior staff and set fire to oil and jute godowns, inflicting considerable financial loss. Fire had to be opened; 9 convicts were killed, 47 were wounded and 14 escaped—of whom 7 were subsequently recaptured. Among the jail personnel 1 warder died of injuries received, 5 were seriously and 31 otherwise injured. The aid of armed troops finally put an end to this "unseemly ebullition of misplaced enthusiasm."

This demonstration of "non-violent soul-force" not having succeeded, a further riot occurred on the 1st of October. On this occasion a report was spread that a convict in the jail hospital, who had had MacIntyre's splints applied for pain in the legs, was being tortured. Firing had again to be resorted to, but there was no loss of life. Two warders and 5 prisoners were injured.

In the subsequent judicial investigations, one prisoner was sentenced to rigorous imprisonment for two years, three for 18 months, and two for one year. Of 45 loyal prisoners who rendered good service, 8 were released, and 37 were suitably rewarded. Those of the warder staff who rendered conspicuous service in the first outbreak were suitably rewarded, and the offending head warder was punished.

The presence of these "non-violent" non-co-operators, also the differential treatment accorded to them in the matter of extra diet, comforts, and permissions, resulted in a most serious deterioration of the general standard of discipline among the ordinary convicts. On the 1st January, 1922, the number of such "political" prisoners was 3,617; at the end of the year,—chiefly owing to Government clemency in the remission of sentences,—it stood at 162. The district jail at Berhampur has now been set aside for the entertainment of this peculiar class of prisoner.

The year under review was therefore an entirely exceptional one. All three temporary jails were closed during the year; i.e., that at Kanchrapara, a temporary one at Nadia, which was not used, and the provision at the Berhampur Mental Hospital. During the year several of the Jail Committee's recommendations were given effect to. A warders' benefit fund was instituted, the star system of classification of prisoners was introduced, a new set of rules with regard to visitors was introduced, special provision with reference to religious facilities was given, and measures taken to remove all non-criminal insanes and mentally-defective prisoners to a special ward in Bhawanipur Mental Hospital in place of retaining them in prisons for observation.

The average daily strength of prisoners was 15,219 as against 14,660 in 1921, and the jails were in general overcrowded during the year. At present financial considerations render it impossible to adopt the Jails Committee's recommendation to separate central jails for habitual prisoners from district jails for casual and short-term prisoners.

There was also a regrettable increase in 1922 in the number of prisoners under 16 years of age, 687 for 1922 as against 338 in 1921. To a considerable extent the non-co-operation movement, which especially took advantage of the young and inflammable mind, was responsible. A scheme is under consideration for the establishment of a reformatory school and other industrial schools prescribed by the Bengal Children's Act. The Juvenile Jail at Alipore continued to do useful work, and here—since the introduction of the star system of classification and the reformatory scheme,—matters have improved considerably. The ratio of prison discipline offences has sunk from 73 per average population in 1921 to 32 in 1922. The Calcutta Prisoners' Aid Society has rendered useful help in securing employment for such discharged youths.

The large percentage of short-term sentences still calls for remark. Although such short-term sentences may appear to magistrates to solve many difficult problems, their effect upon the casual and non-habitual prisoner is disastrous; he is only too often thereby converted by association with habitual criminals into a life-long recidivist. During the year under review no less than 31 per cent. of sentences were for periods of less than one month, 24 per cent. for periods of from

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one to three months, and 18 per cent. for periods of from three to six months; or a total of no less than 73 per cent. for less than six months; convictions for theft being a predominant feature of such short-term sentences. This "system" is hopeless; either such a casual offender is a first case and should be treated leniently; or else he is an habitual who should be severely dealt with. The harm which results from sending youths under 16 and casual first offenders to a general jail for a short-term sentence is one which is recognised and commented upon by every Inspector-General of Prisons in India. Here it is of interest to note that habituals form at least 22 per cent. of all jail admissions during the year; such offenders should be separately segregated in separate jails, where they cannot poison the minds of the youthful or the casual offender.

Despite the unusually large number of prisoners dealt with during the year, offences against discipline totalled only 16,823 as against 16,338 in 1921. The number of punishments inflicted on warders was 955 as against 908 in 1921; and 55 warders resigned as against 52 in 1921. The remission system is reported to be working well, whilst the Claude Martin Fund, under which grants are made to released prisoners, is very helpful.

Financially the year was expensive; Rs. 3,70,631 being expended on buildings and Rs. 2,27,120 on repairs; the cost of the extra temporary jail accommodation being heavy. The total expenditure for the year was Rs. 28,04,954 as against Rs. 24,62,492 in the previous year. The total earnings in jail manufactures for the year was Rs. 6,81,199. Among other items of interest in this connection are the manufacture of police, chaukidari and prison clothing at Midnapore Central Jail, the woollen factory at Dacca Central Jail, and the manufacture of quinine and cinchona febrifuge tabloids at the Juvenile Jail, Alipore, which made a total profit of Rs. 1,69,935 during the year.

The sickness and mortality rates were low, the daily average sick being 43 per mille, and the death-rate only 18 per mille,—well below the previous quinquennial average. The more important diseases were dysentery, —39 out of 240 deaths being due to this,—pneumonia, phthisis and malaria. Suri and Comilla Jails now have special tuberculosis wards to which tubercular prisoners are sent. In spite of the gross overcrowding which occurred during the year, the health of the prisoners was exceptionally good. Barasat Jail, which is in a notoriously unhealthy neighbourhood, and which has always had a bad reputation was reduced to the status of a Subsidiary Jail during the year.

The jail superintendents had an exceedingly trying and anxious time throughout 1922, but they and their staffs did excellent work, and the following superintendents are singled out for good work done during the year:—Major C. A. Godson, I.M.S.; the late Major S. Chuckerbutty, I.M.S.; Lt.-Col. Thurston, I.M.S.; Major Walker, I.M.S.; Major J. A. Brachio, I.M.D.; Rai S. C. De Bahadur; the late Major S. C. Pal, I.M.S.; and Babu N. K. Ray and Dr. K. B. Narayan.

Correspondence.

CLITORIA TERNATEA IN LEUCODERMA.

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—I have recently seen beneficial effects in leucoderma by applications of the root of white *Clitoria ternatea*,—(*Gokarna, Vishnu—Krantu*)—in water. May I enquire whether any of your readers have used it for this purpose, and if they have, with what results?

The root produces no inflammation or blistering.

Yours, etc.,
K. G. KHANDLKOR, M.B., B.S.

CIVIL DISPENSARY,
MANDSANR, C. I.:
27th March, 1924.

[Dimock in his *Pharmacographia Indica*, 1890, Vol. I, p. 458, mentions the use of the root in croup, and as a purgative and diuretic, and states that a syrup of the deep blue flowers is used as a colouring agent, but makes no mention of its use in leucoderma.—ED., *Indian Medical Gazette*.]

AN AUTOMATIC FLY PROOF LATRINE SEAT.

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—May I be permitted to encroach on your space in criticism of the article on an Automatic Fly Proof Latrine by Major Jolly in your issue of December, 1923.

Major Jolly states that the main disadvantage of my patent fly proof latrine seat is that the shutters are liable to be soiled. The shutters can only be soiled by an individual suffering from "explosive" diarrhœa, when the pattern formed by his discharge would tend to spread laterally and then become liable to splash the vertically placed shutters. A solid or soft motion in the squatting position assumed by the Indian falls vertically 3 inches below the line joining the heels and could not soil the shutters.

The exceedingly simple mechanical arrangement for opening and closing the shutters of my latrine seat far transcends in mechanical efficiency, the complicated system of levers instituted in Major Jolly's latrine seat. The frequent application of grease to eliminate friction and the close supervision and discipline required in the use of Major Jolly's seat places it in my opinion out of the sphere of practical politics.

In both our seats a few flies may regale themselves during the act of defaecation and be subsequently entrapped by the closing of the shutters. But I think the upward sweep from the vertical to the horizontal position of the shutters of my latrine seat will tend to flick away the flies, whereas in Major Jolly's latrine seat the shutters run in horizontally without any such flicking action.

The further criticism by Major Jolly that the foot rest of my seat is awkward owing to its lateral slopes is more imaginary than real and does not militate against its comfortable use.

If Major Jolly should care to give a fuller trial of my latrine seat in his district, Messrs. Massey & Co., Ltd., Madras, who are the sole manufacturers of the seat, would be pleased to send quotations for any number that may be required as individual or grouped seats.

Yours, etc.,
W. R. J. SCROGGIE,
Lt.-Col., I.M.S.

GOVT. MENTAL HOSPITAL, MADRAS:
MADRAS;
18th March, 1924.

INTRAVENOUS IODINE IN PLAGUE.

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—It is Colonel Jeudwine's article on the intravenous use of iodine in your December 1923 issue, which inspires me to write to you this short note.

This note is on the treatment of plague, because Colonel Jeudwine has recorded its use in this disease in only a small number of cases, therefore I think it may not be out of place if I give my experience of the method in about one hundred cases of plague, in which there were many cases of septicæmic and pneumonic varieties.

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I tried different methods for the treatment of this plague and finally decided to inject iodine intravenously in the hope of killing the bacteria in the blood-stream, and for this purpose made a solution of iodine 2 grms., potass. iodide 3 grms. and sterile normal saline (0.9 per cent.) 125 c.c. Of this solution 10 c.c. is injected intravenously once a day for three days consecutively. The bubo, if any, is incised not excised, and a strophanthus, strychnine and quinine mixture given orally every six hours. With this treatment,—the condition of the bowels being also attended to—most of the patients recovered in a week's time. In those cases where treatment was begun before the onset of delirium the treatment was very successful, but where delirium commenced before the treatment was begun, it was almost a failure; as far as I remember, only such four cases were saved out of some 25. On the whole, however, my estimate of the success of the treatment may be placed at a figure of 75 per cent.

Yours, etc.,

S. Z. NAQUVIE, L.M.P.,

Medical Officer, Jalalpur Dispensary, Fyzabad.

28th February, 1924.

"DENTAL SURGERY FOR MEDICAL PRACTITIONERS."

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—In reviewing my book "Dental Surgery for Medical Practitioners" the reviewer says that "it should be very helpful to any medical practitioner who desires some general knowledge of dental surgery" and I thank him for that. While doing so, however, I feel I must also show my disappointment at the method used by him. A reviewer, to my mind should examine the book in its broad aspect, which it is supposed to present to its readers, and show the public whether or not the author has succeeded in that object. Instead of that I regret that the reviewer has chosen a few minor, unimportant, and moreover controversial points for criticism. To assure the readers of my book that, in spite of my reviewer's criticism of these points, I am right in upholding all the statements in my work, it is necessary to answer his criticisms, and to request you to be good enough to insert this letter in your next issue. I will answer his points in order.

1. Commenting on the subject of *tartar*, he says that pus is not one of the constituents of it. That I have not said that it is, will be clear to him if he will read the passage again. What is meant is that a piece of tartar just removed from the mouth when examined under a microscope will show, among other things mentioned on p. 46, some pus cells also.

2. Commenting on my statement on p. 56 that carbohydrate-eating Indians are freer from caries than are meat-eating Europeans, he remarks that "it may be true." On that point I may assure him that it not only "may be true" but that it *is* true. He seems to have an idea that I attribute the enormous extent of caries among Europeans to a meat diet; I have never said so, for I know it is not so. For my part I think that their unhygienic habit of having their tea and chota-hazri in bed without cleaning the mouth, and their excessive use of chocolates and other sweets are responsible for the condition.

Regarding his remark that "the tremendous prevalence of pyorrhœa among Indians is largely due to the soft nature of their diet;" after a close observation of several years I have come to the conclusion, that it is more, nay practically entirely due to the excessive use of *bawal or nim twigs* for cleaning the mouth, and the *pan-sopari* that an Indian chews practically the whole day. My opinion on this point is upheld by other observers in this subject, from East Africa and Siam.

4. As for his criticism of my recommendation of a hard tooth-brush, I will only say that it is a matter of opinion. But I maintain on the strength of considerable observation that a hard tooth-brush will clean the teeth better than a soft one.

5. For an answer to his recommendation of *mouth-washes* and *pastes*, I will make a present to him of an article on mouth-washes and tooth pastes by Dr. Zarbough in *Oral Topics* of April 1920. That article quotes from a lecture on mouth-washes and tooth-pastes by Prof. H. C. Kelly that "Many are merely frauds, containing mere soap dissolved in water and lightly coloured and flavoured. To purchase the ordinary tooth-liquids (my reviewer's mouth-washes) is a waste of good money." Of the tooth-pastes (with which my reviewer is so enamoured) Dr. Zarbough says: "Tooth-pastes are a snare and a delusion. While they have not the same fault that washes have, as the patient will use the brush with the paste, still the most harmful thing about the pastes is the fact that they contain enormous quantities of glycerine, soap, and oil to keep them soft and saleable. Glycerine and soap should never be used in the mouth, because of their softening effect on the gums. They become soft and spongy, and then bleed."

Exactly the same is my opinion of these mouth-washes and pastes, and I have declared it in my lectures at the Grant Medical College since 1915, *i.e.*, long before the appearance of the article in *Oral Topics*.

6. In sympathy for the suffering poor Indians in places far away from dental help, he disagrees with my advice to medical practitioners to stop short at palliative treatment and to leave legitimate dental treatment to the dental surgeon, and suggests that the medical officer should have a knowledge of simple filling of teeth. It is indeed good of him to care for the dental sufferings of the poor, but the method suggested for its relief is wrong. To encourage medical men to get a superficial knowledge of dentistry and to practice it on the poor, will be encouraging quackery. The correct remedy is to propose means (dental schools and hospitals) of producing qualified dentists in sufficient numbers for the large towns and out of the way places, instead of encouraging medical men to inflict their scanty knowledge of dentistry on the poor. If my reviewer knew the results of such infliction, as I and the Bombay public do, he would not suggest the remedy that he did.

7. As to his suggestion that all operators should learn to use only one pair of forceps I may say that it is a retrograde one. It reminds one of that huge joke of the dental manufacturers, the so-called "universal forceps."

8. Disagreeing with my statement about the position of the gag, he asserts that there is only one place for the gag and that is the front of the mouth. I suggest that it is the only one place for the gag to successfully dislocate a tooth or two.

Yours, etc.,

J. J. MODI, L.M. & S., L.D.S. (Eng.),

56, ESPLANADE ROAD,
FORT, BOMBAY, INDIA:
March, 1924.

INTRAVENOUS AIR EMBOLISM.

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—The correspondence that was started in your issue of January, 1922, by Major Porter, regarding the danger of injection of air into a vein, was lightly taken up, and unmeritedly dropped before a conclusive finding was arrived at. One feels uncertain whether Major Porter's optimism is justifiable *in toto*. The intravenous route is the route of necessity in the treatment of several intractable diseases. One should therefore be possessed of definite scientific knowledge regarding the effect of injecting air into the circulatory system. As regards Major Porter's point as to the "admission of a bubble or two of air into a vein in the forearm,"—one is not sure whether an air bubble, in a hypodermic syringe, which rises and comes up to

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the piston as soon as the syringe is tilted for puncturing the vein, ever passes into the circulation. I have often noticed such a bubble flattening up and accommodating itself in the space between the piston and the nozzle of the syringe. In fact, a small volume of air, when coming last, can rarely be forced into the circulation against the pressure of the blood at the point of the needle. This will explain away all the communications that were published in the January and April, 1922, numbers of your journal. But when an air bubble is incarcerated and forced from behind by a column of liquid—as would be the case with a saline transfusion or salvarsan apparatus—then there should be no doubt about the passage of the air into the circulation. But then patients have died as the result of this accident.

It is no use quoting from standard authors to support one's argument, for air embolism has seldom been discussed in the books. What Dr. R. S. Grewal quotes from Carless' "Surgery" is not to the point. The passage is palpably meant for a solid embolus. It would be a great advantage if some one possessing the necessary facilities could take up the question and experiment on animals, and publish a report on a thorough scientific basis. Otherwise, optimism may gradually lead to negligence, and, in its wake, to disaster.

Yours, etc.,
R. K. BHATTACHARYYA, M.B.

NABADWIP;
28th March, 1924.

BRITISH INCOME-TAX REFUNDS.

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—A misleading impression appears to have gained currency, through the press, that persons claiming refunds of British income-tax have been called upon to pay duty on income derived from sources outside Great Britain.

An impression so utterly false and entirely erroneous in its conception and distinctly libellous on the British Inland Revenue authorities should be immediately refuted.

Applications for the refund of British tax cannot in any way involve a person permanently residing outside Great Britain in tax on income derived from sources outside that country or in any liability whatsoever. On the other hand, every person of British nationality who derives income from Great Britain in any form (which is always taxed at the highest rate current) may recover the whole or at least a proportion of the tax so deducted.

If there is any point in this connection on which any of your readers would like enlightenment, I shall be pleased to answer any queries sent to me at 13, Buckingham Palace Gardens, London, England.

Yours, etc.,
WILFRED T. FRY.

13, BUCKINGHAM PALACE GARDENS,
LONDON, S.W.1;
5th February, 1924.

THE BRITISH EMPIRE EXHIBITION.

WE have received from the Deputy Director-General, I.M.S., a copy of a letter from the Secretary of the Royal Society of Medicine to the High Commissioner for India, dealing with the arrangements made for welcoming medical visitors to the British Empire Exhibition, as detailed below, which will be of interest to medical men visiting the United Kingdom this year.

THE HIGH COMMISSIONER,
INDIA OFFICE,
42, GROSVENOR GARDENS, S. W. 1.

DEAR SIR,—You have probably seen it announced that this Society in conjunction with other medical societies in London, is endeavouring to organise a special welcome to medical visitors coming to London for the Exhibition, and it is important for our purpose that this should be known as soon and as widely as possible. It seems that the most practical way of gaining this object is through the press of the various Dominions, and we shall be glad to know whether your office might be depended upon to inform the editors of the various journals and ask them to inform the members of the profession in your country, and to ask them if they are intending to come to London to inform our Committee as soon as possible of their intended visit and the date of it.

The Committee has appointed a special Secretary to deal with all correspondence, *viz.*, Mr. Mortimer Woolf, F.R.C.S., and he should be addressed at our office at 1, Wimpole Street. I am sure we may depend that you will do what is possible to make our efforts practical.

Yours very truly,
(Sd.) J. W. MACALISTER

THE ROYAL SOCIETY OF MEDICINE,
1, WIMPOLE STREET, LONDON, W. 1.
11th March, 1924.

Service Notes.

OBITUARY.

Sir Walter James Buchanan, K.C.I.E., M.D., Lieut.-Colonel, I.M.S. (ret.).

WE very much regret to record the death from pneumonia on March the 22nd of Sir Walter Buchanan at his residence in Dublin. He was the son of Robert Buchanan of Fintona, County Tyrone, and was educated

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at Foyle College, Londonderry and Trinity College, Dublin, where he graduated B.A., M.B. and B.Ch. in 1887. He won the travelling medical scholarship at Trinity in 1887, studied in Vienna, and took the diploma in State Medicine of his university in 1888. After holding the posts of resident surgeon at Sir Patrick Dunn's Hospital and at the National Eye and Ear Hospital in Dublin, he entered the Indian Medical Service in October, 1887.

His first four years in the service were spent in military duty, during which time he served in the China—Lushai campaign of 1889-90, gaining the N. E. frontier medal and clasp. Attaining to civil employment in 1892, he first served as civil surgeon of Midnapore, and then joined the Jail Department. For the next twenty-seven years his activities centred on two subjects, the improvement of the prisons of Bengal, and the *Indian Medical Gazette*, which he edited for twenty years. The success of this journal is indeed largely due to the labours of its two most brilliant editors, the late Colonel Kenneth McLeod, who edited it from 1871 to 1892, and Sir Walter Buchanan, who edited it from 1899 until his retirement from the service in 1919. The *Gazette* was fortunate in getting into the hands of this very able organizer. His great literary ability and taste were apparent from the moment he took over charge, and the circulation and influence of the *Gazette* improved enormously.

In the Jail Department, Sir Walter Buchanan's activities were untiring. He served in turn as Superintendent of Bhagalpur Central Jail, for a short time as Superintendent of Alipore Central Jail, and was appointed Inspector-General of Prisons, Bengal in 1902,—a post which he held for seventeen years until his retirement. Under his administration, the sanitation of the Bengal prisons was enormously improved, whilst the death rates were substantially reduced. His fine work in the department was recognised by the award of the C.I.E. in 1913, and promotion to K.C.I.E. in 1918. He was on the Indian Prisons' Commission of 1919-20, and much of the value of the reforms introduced by that Commission, —reforms which are to-day making for material improvement in the prisons of India,—was due to Sir Walter Buchanan's labours.

Among other publications, he was the author of *The Darwinism of To-day*, 1881; the *Jail Manual*, 1898; the article on inflammation of the liver in the third edition of Quain's *Dictionary of Medicine*, 1902; and the chapter on Indian medical jurisprudence in the fifth edition of Taylor's *Medical Jurisprudence*, 1905. He married a daughter of the late Mr. E. Simpson Byrne; she died in 1916. He leaves one son,—an officer in the Royal Scots Fusiliers.

After his retirement from India, he served for three years as a member of the Central Council of the British Medical Association, and of its Naval and Military Committee—where his influence was marked in the successful efforts made by that Association to secure improvements in the status and pay of the Indian Medical Service. His deep interest in the Service was maintained after his retirement,—and in establishing the Walter Buchanan Scholarship at Epsom College for the sons of medical men, he made it clear that perference would be given to the sons of I.M.S. officers. In a letter received from him a year ago he commented upon what he considered to be the improvement in the *Indian Medical Gazette*, but added the characteristic comment "Don't neglect the Service Notes."

Sir Walter was of an extremely genial dispositition and his personal popularity was great. Late in life he took an interest in freemasonry and attacked the subject with characteristic energy. He became Master of Lodge Everest and it was a great treat to see him at his duty. He was more than usually efficient, whilst his rich Irish accent and natural gift for oratory greatly helped the general effect.

Residing for many years at the United Services Club, Calcutta, he was a delightful and entertaining host. He was a keen fisherman and an enthusiastic golfer. Sir Walter was intensely energetic in everything he took up and it was with genuine regret he left India and the work which he loved so well. He was a pessimist to the end as to the future of the Service he adorned for so long. His death adds another name to the long roll of honour of Bengal officers whose devoted labours on behalf of India have been followed by but a few scanty years of leisured retirement.

Major F. W. Cragg, M.D., D.SC. (Edin.), F.R.S.E., F.E.S., I.M.S.

IT is with the deepest regret that we learn of the tragic death of Major F. W. Cragg, I.M.S., from typhus fever at Lahore on the 23rd of April, 1924. Major Cragg's death adds another name to the long but brilliant list of scientific investigators who have lost their lives in the prosecution of medical enquiries for the benefit of humanity. He died as truly on active service as did any officer killed in the Great War.

Francis William Cragg was born on the 19th of May, 1882, and was educated at Edinburgh University, where he took the M.D., and—in later life—the D.Sc. degrees. Entering the Indian Medical Service on the 1st of September 1906, after spending the usual period in military duty, he was posted to the King Institute of Preventive Medicine at Guindy, and gave early promise of a brilliant career. His industry was enormous and his technical and medical abilities were of a very high order,—in fact he was one of the three leading medical entomologists in the country. At Madras he came into association with Major W. S. Patton, I.M.S., and the combined work of both authors led to the publication in 1913 of Patton and Cragg's *Text-Book of Medical Entomology*—which is to-day the greatest testimony to the work and abilities of both authors.

Transferred in 1913 to the Central Research Institute at Kasauli, Cragg soon secured admission to the Medical Research Department, and became a regular contributor of a series of most valuable entomological papers to the *Indian Journal of Medical Research*. In 1914 on the outbreak of the Great War he was recalled to military duty. His war service was mostly performed in Egypt and Bombay. As a military medical officer, when attached to a hospital train and again when doing the administrative sanitary work of a brigade, Cragg performed his duties in the extremely thorough way which was so characteristic of the man. As pathologist to the Victoria War Hospital, Bombay, he worked with intense energy, —contributing a valuable series of papers to the *Indian Journal of Medical Research* on amœbic dysentery, intestinal protozoal infections and aberrant types of malarial parasites.

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"A mother's milk is only adequate when she receives a sufficiency of these subjects (vitamins) in her own diet."

pp. 70 and 100. Report of Joint Committee of Lister Institute and Medical Research Committee on "Accessory Food Factors (Vitamins)." H.M. Stationery Office, 1919.

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A 10 per cent. standardised extract of infundibular substance as recommended by the Medical Research Council for obstetrical and general purposes. Given intramuscularly, 'Pitibulin' Obstetric is invaluable for promoting uterine contraction in the second stage of labour and after delivery; also for the prevention of post-partum hæmorrhage.

Preparations:

'Azoule' 'Pitibulin' Obstetric—½ and 1 c.c. in each. In boxes of 6 and 12.

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'Pitibulin' Surgical

A 20 per cent. extract of infundibular body. This preparation is identical with 'Pitibulin' as hitherto supplied by this House. Its use is especially indicated to raise blood pressure in surgical shock and post-anæsthetic collapse. In very urgent cases it may be administered per rectum or intravenously diluted with normal saline.

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Preparations:

Elixir 'Polyglandin'—1 fluid drachm is equivalent to 5 grains of fresh mixed glands (including ½ gr. Thyroid Gland).

In 4 oz., 8 oz. and 16 oz. bottles.

'Kapsol' 'Polyglandin'—Each capsule is equivalent to 5 grains of fresh mixed glands (including ½ gr. Thyroid Gland).

'Azoule' 'Polyglandin'—15 mins. is equivalent to 10 grains of fresh glands (including 1 grain Thyroid Gland).

Leaflet giving further particulars will be sent on request.

Allen & Hanburys Ltd., London.

Special Representative for India:

A. H. P. JENNINGS, Block E, 2nd Floor, Clive Buildings, Calcutta.

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From Bombay he reverted to his post as one of the Assistant Directors at the Central Research Institute, Kasauli, and commenced work which resulted in a further series of entomological papers of great value. Throughout the whole of his entomological papers,—however, detailed and technical they might be,—Cragg never lost sight of their bearings upon wider and more general problems. He would ever revert to the biological laws and principles underlying his research. One of the most noteworthy of his contributions to medical literature, for instance, is his series of papers in 1920–1923 upon the distribution of the Indian species of rat fleas, in which he shewed the correlation of the prevalence of *Xenopsylla cheopis* with plague, and the absence of correlation of *X. astia* and *X. braziliensis* with plague,—a paper with a wide practical bearing, since a study of the species of rat fleas prevalent in any locality may determine its susceptibility or otherwise to plague.

In 1921 he set to work upon the problems of relapsing fever in the United Provinces, and reverted to the same subject in 1922 on his return from leave. In a series of most important papers he demonstrated the epidemiology of the disease in the United Provinces, experimentally proving its transmission by lice, and shewing how the epidemic years were associated with an abnormally low temperature and abnormally high humidity during the spring months, which prevent the annual delousing of the population that usually occurs with the onset of the hot weather, and prolonging the life of the pediculi concerned. During this investigation, he contracted a severe attack of relapsing fever himself—an attack which weakened a constitution already impaired by years of overwork and attacks of malaria.

In spite of ill-health, however, Cragg remained vigorously at work. The problem of the existence of typhus fever in India, and especially of its importation into India over the North West Frontier came up for consideration, and, at his own request, Cragg was deputed to study it in December 1923. Proceeding to Kashmir, he shewed that some at least of these epidemics of "typhus" fever were, in reality, epidemics of relapsing fever,—especially that in the Lolab Valley. Another epidemic, however, which was raging among villages on the road up to the Kashmir Valley, presented peculiar features Its clinical features were those of typhus, but in other ways it differed from the classical description, and Cragg proceeded to Uri to study it. Here he contracted his fatal illness in the ill-lighted, ill-ventilated, insanitary hovels of the people who were the subjects of the epidemic under investigation. He was taken to Lahore, and the seriousness of his illness was scarcely at first realised. Realising the importance of establishing whether it was typhus or relapsing fever, Cragg himself insisted until he lost consciousness on the fullest notes of his own case being taken. It was only towards the very end of his illness that the Weil-Felix reaction became positive. It is sad to record his death from the very disease which he was investigating. It was hoped that he would have joined the kala-azar commission which is about to be appointed to investigate the mode of transmission of the disease as entomologist, and his loss in this connection also will be severely felt.

In Major Cragg, India loses one of her few really brilliant entomologists, and his loss can ill be spared. He was a rapid, accurate and most painstaking worker. His energy was enormous, and he would often work far into the night. Socially, he was a delightful companion and host, and gifted with a keen sense of humour. He was an ardent follower of the cult of physical exercise, very fond of walking, and an excellent shot with both gun and rifle.

Major Cragg leaves a widow and two children, who are in England. To them we convey the sympathy of the whole Service in India. India can ill spare the loss of one of her most distinguished and brilliant medical research workers. We trust that Government will mark its appreciation of the devoted service which he rendered to this country.

APPOINTMENTS AND TRANSFERS.

ON return from leave, Lieutenant-Colonel H. B. Steen, M.D., I.M.S., Civil Surgeon, did general duty at the Medical College Hospitals, Calcutta, from the forenoon of the 29th February 1924 to the afternoon of the 16th March 1924.

Major (now Lieut.-Colonel) R. M. Barron, D.S.O., I.M.S., to be acting Lieutenant-Colonel from 22nd July 1916 to 18th October 1919, whilst commanding a Casualty Clearing Station, Mesopotamia.

Major T. L. Bomford, M.B., I.M.S., is appointed to act as a Civil Surgeon and is posted temporarily to Murshidabad, *vice* Lieutenant-Colonel A. H. Proctor, D.S.O., I.M.S., transferred.

Major H. H. King, I.M.S., is appointed to officiate as Assistant Director, Central Research Institute, Kasauli.

Major J. A. Sinton, I.M.S., is appointed to officiate as Assistant Director, Central Research Institute, Kasauli, *vice* Lieutenant-Colonel S. R. Christophers, C.I.E., O.B.E., I.M.S., detailed for research work under the Indian Research Fund Association with effect from the date on which he assumes charge of his duties.

Major W. Ross Stewart, Indian Medical Service, Staff Surgeon, Bangalore, is appointed, in addition to his own duties, to officiate as an Agency Surgeon and is posted as Residency Surgeon, Mysore, during the absence on leave of Lieutenant-Colonel R. F. Standage, C.I.E., I.M.S.

Major A. G. Tressider, M.D., I.M.S., is appointed to officiate as Surgeon to His Excellency the Governor of Bombay, with effect from the forenoon of 15th March 1924 during the absence of Lieutenant-Colonel G. J. Grafton Young, I.M.S., on leave.

The services of Captain C. J. Lodge-Patch, M.C., I.M.S., are placed permanently at the disposal of the Government of the Punjab, with effect from the date on which he is confirmed as Superintendent of the Punjab Lunatic Asylum, Lahore.

The services of Captain J. M. R. Hennessy, I.M.S., are placed temporarily at the disposal of the Government of the Punjab for employment in the Jail Department, with effect from the date on which he assumes charge of his duties.

Captain J. F. Holmes, I.M.S., to be acting Lieutenant-Colonel whilst holding appointments with Mesopotamian Expeditionary Force from 10th to 15th August 1918 and from 1st December 1919 to 1st February 1920.

Captain W. C. Spackman, M.R.C.S., L.R.C.P. (Lond.), M.B., B.S. (Lond.), D.T.M. (Lond.), I.M.S., is appointed to act as Civil Surgeon, Nasik, with effect from the forenoon of 27th March 1924.

LEAVE.

Lieutenant-Colonel H. B. Steen, I.M.S., was granted by the High Commissioner for India furlough for two months, in extension of the combined leave sanctioned in Notification No. 2843-Medl., dated the 2nd November 1921.

Lieutenant-Colonel H. B. Steen, I.M.S., is granted furlough for three days from the 10th to the 12th November 1922, in extension of the furlough for two months granted to him by the High Commissioner for India.

Lieutenant-Colonel G. McPherson, C.I.E., I.M.S., has been granted a further extension of leave for four months on medical certificate with effect from the 20th May 1924.

In modification of Government Notification No. S. 20|10, dated the 19th December 1923, Lieutenant-Colonel R. W. Anthony, I.M.S., is granted, with effect from the 9th March 1924, leave on average pay for seven months and twenty-five days combined with leave on half average pay for six days.

In modification of Government Notification No. S. 20|16, dated the 21st February 1924, Lieutenant-Colonel H. M. H. Melhuish, I.M.S., Acting Director of Public Health, has been granted leave for six months with effect from the 30th March 1924.

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Lieutenant-Colonel J. B. Christian, I.M.S., Civil Surgeon, is allowed leave for eight months with effect from the 27th March 1924.

Major C. J. Stocker, M.C., M.D., I.M.S., Superintendent, Peshawar Jail, is granted 12 months' study leave, with effect from the 1st September 1924, or any subsequent date on which he may avail himself of it.

PROMOTIONS.

Lieutenant-Colonel to be Major-General.

Alfred Hooton, C.I.E., *vice* Major-General William Ernest Jennings, M.D., K.P.H., retired; with effect from the 11th January 1924. Major-General Hooton's tenure of appointment will reckon from this date.

Lieutenant-Colonels to be Colonels.

Thomas Bernard Kelly, D.S.O., F.R.C.S.E., V.H.S., *vice* Colonel W. G. Pridmore, C.M.G., M.B., retired; with effect from the 1st November 1923, Colonel Kelly's tenure of appointment will reckon from the 6th March 1924.

The promotion to his present rank of Major Trevor Laurence Bomford, M.D., notified in Army Department Notification No. 1557, dated the 5th August 1921, is antedated from 31st July 1921 to 31st January 1921.

To be acting Majors whilst holding appointments with Mesopotamian Expeditionary Force—

Tempy. Captain R. E. Dadachanji, M.B., from 1st January 1918 to 15th April 1918.

Captain P. D. Chopra, M.B., from 14th August 1918 to 31st December 1919.

Captain J. F. Holmes, from 16th August 1918 to 1st October 1918 and from 13th November 1918 to 29th September 1919.

Captain N. M. Mehta, from 2nd November 1918 to 23rd March 1920.

To be acting Major.

Captain (now Major) R. de S. B. Herrick, D.S.O., I.M.S., to be acting Major while holding an appointment as Deputy Assistant Director of Medical Services. From 13th September to 31st October 1919.

RESIGNATIONS.

Lieutenant I. C. Robertson, M.C., I.M.S., dated 15th April 1924.

The Governor-General is pleased to accept the resignation of the Hon'ble Major-General R. C. MacWatt, C.I.E., M.B., F.R.C.S., K.H.S., I.M.S., of his office of Member of the Council of State.

RETIREMENTS.

Colonel Bhola Nauth, C.I.E., K.H.P. Dated 14th April 1924.

Lieutenant-Colonel J. M. Holmes, M.B., I.M.S. Dated 30th January 1924.

Lieutenant-Colonel L. B. Scott, M.D., I.M.S. Dated 5th March 1924.

Admissions to the Indian Medical Service.

J. E. Gray, J. S. Riddle, G. P. F. Bowers. Dated 8th January 1924.

R. McRobert, G. Dockery, J. C. Drummond, F. H. Whyte. 22nd February 1924.

NOTICES.

NEW X-RAY TUBES.

X-RAYS, LTD., 11, Torrington Place, Gower Street, London, W. C. 1, have recently placed on the market two new models of X-ray tubes. One is Philips' R. I. water-cooled tube, at £12-10-0, with asbestos regulator. By the use of a special metal with the same coefficient of expansion as that of glass, the copper block of the anti-cathode is no longer required and the platinum cap or seal is also done away with. This tube is constructed with a very small focal spot, and will stand up to a current of 5-50 millamps., at an equivalent spark gap of 5 in. for radiography.

The second is Philips' Vacuum Cooler tube, at £14-10-0. This is fitted with two water chambers; the inner one, of metal, screws right down into the back of the anti-cathode, and contains a small quantity of water under vacuum, the container being also surrounded by water in the outer chamber. Directly the tube is used, the water in the metal chamber commences to boil,—being under low pressure,—and the heat generated in the target is immediately distributed along the whole length of the metal tube, and consequently throughout the entire length of the outer water chamber. It is claimed that the increase of heat-distributing surface is about 100 times that of an ordinary water-cooled tube, and that vibration of the tube is absolutely avoided.

NATIVELLE LABORATORY PRODUCTS.

IN the modern treatment of cardiac diseases three drugs stand pre-eminent; strophanthus, digitalis and quinidine; but it is of importance to prescribe pure products. In a series of small brochures the Nativelle Laboratory, 49, Boul. de Port-Royal, Paris, describe preparations of all three which are claimed to be of exceptional purity and standard composition. The first is crystallised digitaline, which is put up in granules of 1/10th and ¼ of a milligramme, in a 1 in 1,000 solution for oral administration, and in ampoules for intramuscular injection.

A second and interesting preparation is "Solubäine,"—a 1 in 1,000 solution of Ouabäine, Arnaud, for oral and intravenous use. Strophanthin is apt to be variable in composition, but it is claimed that in Solubäine the glucoside, oubaine, is constant in composition and reliability. Here the indications are:—(*a*) prolonged administration of oral doses of from 10 to 20 minims where it is desired to obtain a sustained cardiotonic effect in cases of early cardiac insufficiency; (*b*) medium doses of from 25 to 50 minims daily in right ventricular insufficiency; and (*c*) massive doses, 100 to 150 minims daily for two or three days, in acute cardiac insufficiency; and especially, after venesection in angina pectoris. The preparation is claimed to be non-bitter and to be well tolerated.

A third preparation is Quinicardine, a purified quinidine in tablet form. This will be of interest to medical men in India not only from the point of view of treatment of cardiac arhythmia, but also of the treatment of malaria with quinidine. The tablets are of 20 cgms. each,—approximately 3 grains. The chief indication in the former connection is for auricular fibrillation, with caffeine or digitalis in addition. The tablets are claimed to be free from all traces of cinchonidine and hydroquinine.

Notice.

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles will receive 25 reprints of the literary pages of the "*Gazette*" *gratis*, if asked for at the time of submitting their manuscripts.

REPRINTS OF THE ARTICLE CONCERNED (ONLY) IN PLACE OF REPRINTS OF THE WHOLE OF THE LITERARY MATTER OF THE ISSUE CAN BE SUPPLIED IF PREFERRED AND ASKED FOR. BUT AS THESE HAVE TO BE MADE UP SEPARATELY, THEY ARE NECESSARILY DELAYED.

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Original Articles.

FIRST PROGRESS REPORT OF THE CAMPAIGN AGAINST MOSQUITOES, BACK BAY RECLAMATION SCHEME, BOMBAY.

Reviewing the Origin and Progress of the anti-Malarial Campaign, during the period June 1923 to June 1924.

By Captain B. S. CHALAM,

Medical and Sanitary Officer, Bombay Reclamation Scheme.

(Forwarded by Lieutenant-Colonel F. P. Mackie, I.M.S., Chairman of the Medical and Sanitary Committee, Bombay Reclamation Scheme.)

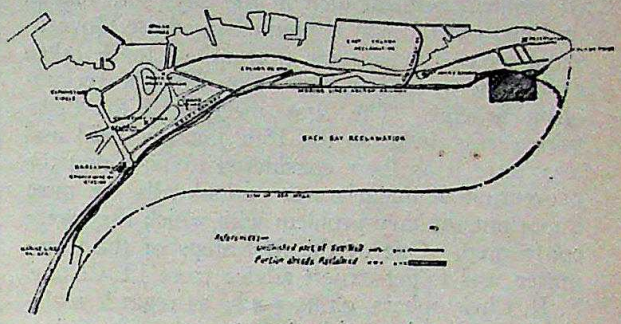
Introduction.—The Back Bay Reclamation Scheme is one of the many-sided activities of the Bombay Development Directorate, a body which was started with a view to relieve the great congestion existing in the city of Bombay. By this scheme an area of 1,145 acres is to be reclaimed from the sea, and added on to the city of Bombay. Bombay city, as it at present exists, is situated on what was an island of the same name, and the shape of the island being exceedingly narrow, this has prevented the expansion of the city, *pari passu* with the increasing importance of Bombay as a great commercial centre and the gateway of India. The location of the docks and the concentration of business in the southern part of the island render the expansion of this part more urgent than anywhere else.

The Present Reclamation Scheme.—The scheme consists of the construction of a massive sea-wall extending from near Marine Lines Station to Colaba Point, about four miles long, and of filling in the area thus enclosed between the sea-wall and the present land margin with suitable material obtained by dredging in the harbour on the east side of Colaba Point or in Back Bay itself, and pumping the dredged material in liquid form through pipe lines to the area to be reclaimed.

Eight storm water drains of an aggregate length of 8,000 yards are to be constructed to take the storm water off the new land and also the water from the existing portion of Bombay which drains into Back Bay. When the filling is completed it will be covered with a layer 12 inches thick of dry earth and after making ample provision for roads, play-grounds, open spaces, etc., two and a quarter million square yards will be available for building purposes. It is not considered necessary for the sea-wall to be completed first before filling in operations can be commenced, and as the sea-wall advances sufficiently far, filling in can be carried out to keep pace more or less with the advancing sea-wall.

In the present instance there are two advancing sea-walls, one starting from near Marine Lines station and the other from Colaba Point. The

LAY OUT OF BACK BAY RECLAMATION.



construction of the sea-wall was commenced in the year 1921 and the wall from Colaba end having advanced sufficiently, filling in operations were commenced in Colaba in December 1923, (*vide* map).

Previous Reclamation Schemes.—The growth of the city of Bombay consists of a series of reclamations, commencing as far back as 1835 when the Colaba causeway was reclaimed. Between 1861 and 1866 reclamation schemes were carried out in different parts of the island. In 1865 the seeds of the present reclamation scheme were sown and a private company was founded to reclaim from the sea 1,500 acres of land in Back Bay. Some progress was actually made when the company was overcome by financial difficulties and the scheme was held in abeyance. Between 1875 and 1880, the Prince's and Victoria Docks were reclaimed, and subsequent to that, reclamation of the Alexandra Docks and Ballard Estate was carried out.

Reclamation and Malaria.—Reclamation connected with the Colaba causeway was commenced in 1835 and was associated with an outbreak of malaria in 1838-41. Reclamation schemes in 1861-66 were associated with an increased incidence of fever mortality in the city of Bombay. The construction of the Alexandra Docks was said to be the cause of a very serious outbreak of malaria affecting a large portion of the city. On the other hand the construction of the Victoria and Prince's Docks, 1875-80, and reclamation at Sewri do not seem to have been associated with any special outbreaks of malaria, and Dr. Bentley ascribes this freedom to the following reason:—

(1) No serious centres of malarial infection existed in the vicinity of the works.

(2) That few permanent breeding places were present.

(3) That the labourers were not encamped on the site of the works.

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As such reclamation works in Bombay have not borne a good reputation so far as malaria was concerned, naturally a certain amount of anxiety was felt by the Government of Bombay as to the probable effects of the present reclamation scheme on the health of the city. Therefore under Government Resolution No. S.A.62, of 16th January 1923, a Sanitary Committee composed of eminent medical men in the city, both official and non-official, was appointed to advise Government as to the sanitary precautions to be taken from time to time in connection with the reclamation scheme. The first meeting of the Committee was held on the 16th January 1923 and they gave it as their considered opinion that the prevention of malaria was undoubtedly the most important sanitary problem with which they were confronted. One of the first steps of the Committee was to get expert advice from Lt.-Colonel S. R. Christophers, C.I.E., I.M.S., as regards malaria in connection with the present reclamation. After personal inspection and going into matters thoroughly Colonel Christophers sent some reports, and his findings may be briefly quoted as follows:—

"The actual conditions relative to the breeding of anopheles likely to result on the surface of the dredged material in the course of various stages of solidification and settling extending to a duration of several years, are, I think, impossible to predict. These will depend partly on the character and porosity of the material dredged. There is not only to be considered pool formation connected with dredging, but also collection of water from the monsoon rainfall on the very extensive newly created land surface in different stages of evolution. In large areas of sludge, fissuring on an extensive scale may be expected. In Mesopotamia mud used in reclamation, in the course of drying, became intersected with innumerable fissures many feet in depth. In cases where water gained access to such areas, it lay deep in the fissures, resulting in breeding places of *A. stephensi* over very large areas and under conditions most difficult to cope with. But whilst there is an unknown element of danger from what may be called possible contingencies connected with the dredged material, my fears are more concerned with what may be called the ordinary concomitants of large engineering works of this kind. Already the embankment along the land margin is a sinister feature and though small hollows, etc., are now being filled in, there are many possibilities in the course of five years for the formation of breeding places. Portions of foreshore seem likely from time to time to be cut off from tidal influence and the possibilities in connection with such areas, especially in the monsoon, are great. Features of the work themselves may also lead to small collections of water, especially during the monsoon, suitable for the breeding of *A. stephensi*, such as was described in the case of the Alexandra Docks. All such sources of supply will almost certainly be constantly changing and the most serious may be of a very temporary character, so that unless close watch is kept they may easily escape notice.

Lastly the period of greater danger may not be during the actual dredging but at some later stage.

Briefly there is no royal road to successful prevention of malaria as a result of the reclamation, as conditions in respect to anopheles cannot be predicted in detail, and only observations and close watch of the area can give the information necessary for suitable preventive measures.

Adequate provision to guard against possible evil effects of the reclamation operations must however also include some arrangement for continuous and close observation of the whole area and its surroundings, and the only recommendation that I can make at present is that an officer with the necessary knowledge and if possible with previous experience be engaged to commence and continue such observations, and to report at frequent intervals. Measures can then be based on actualities and not on suppositions, possibly with a very considerable saving of money and certainly with a greatly increased probability of success."

As a result of the above recommendations, the writer of this report was deputed from Assam, where he was in charge of a malarial enquiry in the notoriously malarial plantations at Nalbari (E. B. Ry), and took charge of the anti-malarial operations on the 23rd of May 1923. A brief summary of the plan of action and the progress of the anti-malarial campaign subsequent to this is detailed below.

Commencement of the Campaign.—The remaining few days in May 1923 were spent in getting together the equipment of a laboratory, the provision of a small office, and the selection of personnel for the anti-malarial gangs. It cannot be too strongly emphasised that a good deal of the practical results obtained from an anti-malarial campaign depends on the right sort of personnel. The malarial inspectors or foremen should be honest, conscientious and hard-working men and not the kind that exhibit a super-abundance of energy in the presence of the officer but sink into the depths of lethargy when the officer's back is turned. It is futile to expect any conscientious work from the coolies of the gang, recruited as they are from the lowest classes. Work has got to be extracted from them by direct supervision. Without such supervision, a cooly when asked to empty a bucketful of oil into several pools in a certain area, will empty the whole bucket in the nearest pool and spend the rest of the time as suits his whim and fancy. These are the inner details of working but they are well worth noting. Equally important, if not more, is that the officer in charge should have plenty of time, and he should make use of it for personal outdoor work along with his men, and he should not be

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hampered by too much office work or routine work of any other nature.

The Anti-Malarial Survey of the Reclamation.—The reclamation area extending from Colaba to Marine Lines has an extensive foreshore which is flat and mainly composed of irregular rocky outcrops with areas covered with low shrubby vegetation. Almost everywhere are pools of water, some of which are only refreshed by the sea at spring tides. The junction of the land with the foreshore is irregular and rocky with many hollows and depressions liable to form breeding places as a result of (*a*) rainfall, (*b*) seepage, (*c*) filling by spring tides. Along the foreshore near this end has been run the embankment carrying the constructional line for the sea-wall, and the area between this embankment and the land margin is a dangerous one full of pools and depressions. In addition, water cisterns, cement tanks, buckets, tins, barrels, empty trucks and various other kinds of water-holding receptacles necessary for engineering purposes are scattered about which are just as dangerous breeding places as the pools and depressions on the ground surface.

In order therefore to get a clear and definite idea as to the actual and potential breeding grounds in the reclamation zone, the whole area was divided for anti-malarial purposes into several sections, such as anti-malarial areas A. B. C. D., etc. A map is maintained for each section every quarter and as mosquito breeding is detected in any section it is indicated on the map by a distinctive spot according as to whether it is of anopheles, culex or stegomyia. These maps are useful records of breeding places and indicate at a glance periods of much and little breeding. The division into anti-malarial sections also, as will be noted below, is very useful for the regulation of the work of the anti-malarial gangs.

Breeding Grounds.—It has been noted by several observers that mosquito larvae can thrive in brackish and even salt water. Dr. Bentley has recorded having found larvae of *A. stephensi* in the brackish water pools on the Colaba foreshore. Therefore with a view to know the relative strength of sea water in which mosquito larvae are able to thrive under natural conditions, and also to know the exact species that breed out under these conditions, several samples of water from these brackish water pools were analysed and the mosquitoes bred out from each sample were carefully noted.

The analysis was very kindly done by Major B. Higham, I.M.S., Chemical Examiner to the Government of Bombay, and the members of the Sanitary Committee referred to above have seen such pools during their inspections. The results of the analyses, as well as the species bred out from the different samples are reported below. It is of considerable interest to note from these records that anopheline larvae have been found under natural conditions in water even as much as three times more concentrated than sea water.

Normal Sea Water.	Sample A.	Sample B.
Volatile and organic matter grains per gallon. 1414·0..	175·0	38·5
Silica. 14·0	0·7	1·4
Iron and Aluminium oxides. 14·0	2·1	1·4
Lime. (CaO) 70·0 ..	44·8	14·0
Magnesia. (MgO) 116·0 ..	18·6	13·3
Carbonic Anhydride (CO_2). 61·6	10·7	19·1
Sulphuric Anhydride (SO_3). 127·2	31·2	32·1
Chlorine. 1·06·0 ..	266·0	136·6
Alkalies (as chlorides of sodium and potarsium) 276·1	154·9	72·3

Sample C.	Sample D.	Sample E.	Sample F.	Sample G.	Sample H.
Total solids 168 grs. per gallon. Chlorine 91 grs. per gallon.	45% of sea water.	90% of sea water.	90% of sea water.	25% of sea water.	Three times more concentrated than sea water.

Water sample as per previous statement.	Species of anophelines bred out.
Sample A ..	*A. rossi* and *A. stephensi.*
„ B ..	*A. culicifacies.*
„ C ..	*A. rossi* and *A. vagus.*
„ D ..	*A. rossi.*
„ E ..	*A. rossi* and *A. stephensi.*
„ F ..	*A. rossi* and *A. stephensi.*
„ G ..	*A. rossi* and *A. culicifacies.*
„ H ..	*A. rossi.*

Besides the brackish water pools mentioned above, breeding has been encountered in several other places, a short list of which is mentioned below.

(1) Wells, where the water surface is sometimes even as much as 40 to 50 feet below ground level.

(2) Water cisterns on the roofs of buildings.

(3) Masonry garden tanks.

(4) Bath wastepits.

(5) Anti-formicas.

(6) Fire buckets.

(7) Cesspits.

(8) Gully traps.

(9) Odd water collections such as water stored in barrels, tubs, or unused railway trucks and boats, filled with rain water.

(10) Tree holes.

The Anophelines found in the Reclamation Area.—The reclamation area extending from Colaba to Marine Lines has been divided for anti-malarial purposes into different areas as mentioned already. Breeding grounds of anopheles in these areas are indicated in the sectional maps by distinctive spots.

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The anopheline species detected up to date in the reclamation area are as follows:—

(1) *A. rossi* (Giles).
(2) *A. stephensi* (Liston).
(3) *A. culicifacies* (Giles).
(4) *A. vagus* (Donitz).

(1) *A. rossi* (Giles).—This is the commonest anopheline larva detected in the reclamation area. It breeds in almost any collection of water including brackish water. It prefers rain water pools. It has been noted by others that this species breeds in brackish water. Adults were caught in habitations.

(2) *A. stephensi* (Liston).—This is the next commonest anopheline larva found in the reclamation area. It was found in association with *A. rossi* on several occasions in shallow pools. It breeds in fresh and brackish water. It is mentioned by other observers as capable of breeding in brackish water. Adults were caught in habitations.

(3) *A. culicifacies* (Giles).—This ranks next in order among the anopheline larvæ detected in the reclamation area. It breeds both in fresh and brackish water. So far as the writer is aware, this species has not been noted before as being able to breed in brackish water. Adults were caught in habitations.

(4) *A. vagus* (Donitz).—This is the least common anopheline variety of the reclamation zone; whereas *A. vagus* is most common in Assam and Bengal, it is said to be very uncommon in western India. It also breeds in brackish water, but no previous reference is available as to this species breeding in such water.

Amount of Malaria in the Reclamation Camp.—As one of the causes of malaria connected with the previous reclamation works, Dr. Bentley has mentioned the location of the labourers on the site of the works. In the present reclamation scheme also the labour is housed on the site of the works, but this seems to be a necessary evil, for so much of the reclamation work depends on the tide hours that the work cannot be effectively and speedily carried out if the necessary labour is not available near by. Such large bodies of labour are liable to cause outbreaks of malaria either among themselves or among the surrounding population according to the respective endemic malarial ratios and the local factors, and if there are any anophelines in the surrounding parts, these emigrants when infected, may cause local spreading slight, severe, transient or permanent malaria according to the factors locally present. As it has been shown that the anopheline factor exists in the surroundings and that facilities for breeding are also present, it appears as if the charge is ready but the ignition is wanting. The commonly accepted standards of measurement of malaria in a locality being the spleen and parasite index, a regular spleen and parasite rate examination is being conducted every quarter in order to make sure that no unusual focus of infection exists amongst the labour of the reclamation. Though it has been found that a certain amount of malaria exists amongst the labour, the endemic index has not been up to now by any means alarming, such as would call for any wholesale prophylactic issue of quinine or other drastic measures.

Progress of the Campaign.—It soon became apparent that anti-malarial operations of the reclamation area should go hand in hand with similar operations in the adjoining parts, for otherwise it would be a case of stringent anti-malarial measures on one side of a road without knowing what was happening on the other side. It therefore became necessary to seek the co-operation of the authorities of the area adjoining the reclamation zone, who were the military and municipal authorities. It was fortunate to have had a D.A.D.M.S. (Sanitary) and a Municipal Health Officer only too willing to co-operate and place every facility in my way. So much so that the anti-malarial operations of the reclamation area in Colaba became practically anti-malarial operations for the whole of upper Colaba. While the military and the municipal authorities assumed responsibility for anti-malarial operations in their respective zones, I was given free access to their areas, so that I could keep in touch should any unusual breeding occur in those areas.

All the British troops in Bombay are located in upper Colaba, the barracks being directly contiguous with the reclamation area, and any increase in anophelines due to reclamation operations is bound to tell on the malarial incidence amongst the British troops. As accurate statistics of malaria amongst the British troops are kept in the British Station Hospital, Colaba, this serves as a good index of the results of anti-malarial operations, which will be referred to below.

The Routine Scheme of Work.—The whole area under my jurisdiction has been subdivided into six more or less equal portions, one for each day of the week. The portions have also been so allotted that they can be covered by my anti-malarial gangs during the day's work. The anti-malarial gang has been divided into two classes, (1) the search party, and (2) the larvicide party (*vide* photographs I and II respectively). Work commences on a Monday morning in a particular portion which is finished that day, and so on each day, until by Saturday evening of that week the whole area is covered. The next week the different portions are again dealt with as far as possible in the same order as in the previous week. The work is also so adjusted that the search party deals with any portion on a different day to that on which the larvicide party goes there, so that if any nymphs are found in any area, it is known that the eggs have been laid for more than seven days and therefore the larvicide party for that area has neglected to oil the water

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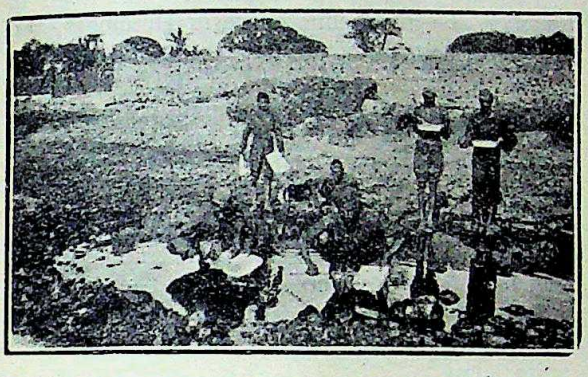
in which they were found and they are promptly dealt with. It will thus be seen that the whole area in my jurisdiction is gone into twice a week and the results to date have been very encouraging, as I shall detail below.

Mosquito Breeding in Habitations Adjoining the Reclamation Area.—A house to house inspection of the adjoining area is also being conducted every week. On arrival at a house the foreman of the gang presents a card, on which the tenants are requested to state whether they are troubled by mosquitoes or not. Even

PLATE I.



Searching for larvæ in the brackish water pools of the Reclamation.

PLATE II.

On duty with sprayers, cans and buckets.

if the answer is in the negative the gang enters the house with their permission and pours a small quantity of larvicide on all likely breeding places. The water cisterns are examined and if the lid is kept open it is closed, and if the lid is not mosquito proof, the necessary request is sent to the authorities concerned to put them right. The kitchen and servants' quarters are then examined for any collections of water, which are either emptied or treated with larvicide. Lastly the garden is visited and examined for any fountains, water taps, wells, flower pots, etc., likely to be breeding places and dealt with as necessary. Cesspools and gully traps are veritable breeding places for culex and stegomyia, but anophelines are rarely met with in these dirty water collections.

Should the tenants complain of the presence of mosquitoes, a special effort is made to find out the breeding places and they can nearly always be discovered if carefully sought for either in the house itself or on the premises. This is the routine which we have followed and which we mean to continue and hope thereby to counteract any danger of malaria from the reclamation operations.

Dredging Operations.—The actual filling in operations commenced in December 1923. The Colaba end of the reclamation area is being filled up and the material is dredged from the harbour across the peninsula through a series of pipes. An absolutely odourless, highly impermeable material in the form of a solid mass of clay and sand is what constitutes the new reclaimed land. The surface condition of this new soil is as follows:—

The harbour soil presenting a stratum of hard clay when set, is impermeable and this results in considerable fissuring during the process of solidification. Water is likely to collect in these fissures and surface depressions and present a favourable breeding ground for mosquitoes.

The New Conditions created by the Dredging Operations.—As the sludge is deposited, a large proportion of the water coming with it is drained off and runs again into the sea. The flow of this water is sufficiently rapid to render breeding along this course unlikely. But a small proportion of the water is side-tracked as it were and causes pool formation here and there, the size of the pool varying in accordance with the undulations in the ground level. These pools require looking after.

(2) The sludge is deposited with such great force that a big depression is created at the spot where it emerges from the mouth of the pipe, and when the next pipe is added on, this depression remains, holding a certain amount of water and thus forms another source of pool formation. These pools exist at the junctions of each pipe-length, and owing to the impermeable nature of the soil, hold water sufficiently long to allow mosquitoes to breed, and also require looking after.

(3) Leakage at the joints of the pipes causes small pool formations in the surroundings.

(4) Sludge fissuring occurs to a certain extent and the fissures, where broad and deep enough, are likely to hold water during the monsoon rainfall.

(5) The new land constitutes a very uneven surface with innumerable depressions, and, the soil being highly impermeable, these surface depressions are likely to constitute very favourable monsoon breeding places. Such mainly are the new factors brought into being by the actual dredging operations which have to be taken into account during the course of the present anti-malarial work.

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The Tide and its Relation to anti-Malarial Work.—The reclamation anti-malarial work is closely connected with the whims of the tide. As the tide, after reaching its high water level recedes, the lace work of the rocks is exposed and amidst their dark circles are left pools which remain in unruffled calm sufficiently long to allow the mosquito to oviposit. As though to counteract our efforts and help the mosquito, the seepage water keeps up the moisture in these pools, which otherwise might dry up under the powerful sun.

A study of the tide therefore indicates to us:—

(1) The possible and most probable places where breeding can be expected.

(2) The places which can be safely disregarded as non-breeding areas, being constantly under tidal influence.

(3) The areas that should be treated with larvicides.

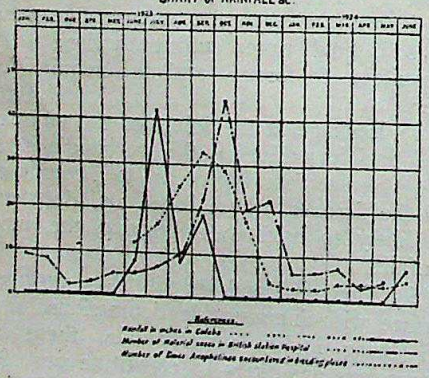
(4) The time that the larvicides should be used; for instance, oiling on any day a likely breeding place which will be completely washed by the tide next day is absolutely useless.

Therefore the tide in the affairs of these malarial operations is a unique feature and due attention is paid to its ways, with which the staff have become fairly well familiarised by constant association.

Rainfall, Anophelines and Malaria in Colaba.—A chart showing the amount of rainfall in Colaba, the anopheline incidence and the number of malarial admissions in the British Station Hospital, Colaba, has been maintained for the whole of the year 1923 down to June 1924 and is herewith shewn (Chart I). A study of it is interesting. The rainfall curve begins to ascend in June, reaches its maximum in July, descends in August and September and comes down to zero in October.

CHART I.

BACK BAY RECLAMATION SCHEME
CHART OF RAINFALL &c.



The anopheline curve begins to rise slightly in the latter part of June, rises still more in July and August, and reaches its height in September. The curve descends slightly in October, still more in November, and drops down to near zero point in December and remains at this level with slight fluctuations till June, when the rains again start.

The malaria curve remains low till June with slight fluctuations, begins to ascend slightly in July, still more in August and September, and reaches its height in October. From there it drops down considerably in the months of November and December and comes down to near zero point in January, remaining at this level with slight fluctuations till June.

The rainfall curve reaches its height in July, the anopheline curve in September, and the malaria curve in October.

The rainfall curve reaches its minimum in October, the anopheline curve in December, and the fever curve about January or February.

The sequence connection rainfall, anophelines and malaria prevalence, although nothing new, is still of interest and marks out the dangerous period so far as Colaba is concerned (*vide* Chart I).

Preventive Work.—The actual preventive work carried out during the period under report may be shortly described as follows:—

(1) The systematic exploration and examination of the whole area for the habitat of mosquito larvæ.

(2) The collection of all tins, pots, pans or other rubbish capable of holding water.

(3) The removal of waste vegetation, the filling up of holes and small hollows and draining away of casual water collections wherever possible.

(4) The examination of water cisterns, wells and cesspools.

(5) The treating with paraffin oil, tar, or other larvicide of all water that cannot be disposed of or properly protected.

(6) The diffusion of knowledge regarding the connection between malaria, mosquito and water collections.

While the practicability of imparting knowledge about malaria as an anti-malarial measure may appear to some as impracticable and visionary, yet it is certainly of considerable utility and an approved public health measure.

It is by no means easy to get the lay intellect to realise that malaria is not caused by some mysterious power of induction, caused by some intangible emanation—the miasma,—but by the mere mosquitoes bred out from water collections which could be avoided to a considerable extent by the expenditure of a negligible amount of energy and care on the part of every individual. The public is like an infant where sanitary measures are concerned, and expects to be spoon-fed. The ignorant are too ignorant, the indolent too indolent and the busy too busy to trouble themselves with sanitary precautions. Nevertheless, knowing as we do how often public health measures are relegated to the scrapings out

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of the public pocket after other departments get the contents of it, and realising that instruction will be the least costly form of anti-malarial measures, in the hope that such instruction might occasionally reach the small percentage of the wise, we have distributed pamphlets, circulated some elementary rules for prevention of mosquito breeding, and organised lectures and demonstrations in the vernaculars for the benefit of the labour employed on the reclamation works. As the Senior Chaplain of Colaba also very kindly volunteered to give a lecture on "Malaria and its Prevention," a copy of my pamphlet dealing with the prevention of mosquito breeding was given to him at his request, as this would also be an effective way of reaching the public.

Prophylactic Use of Quinine.—The amount of malaria in the reclamation camps did not warrant the use of any wholesale prophylactic use of quinine, and I believe the question is still *sub judice* as to the advisability or otherwise of prophylactic issues of quinine among large bodies of labour.

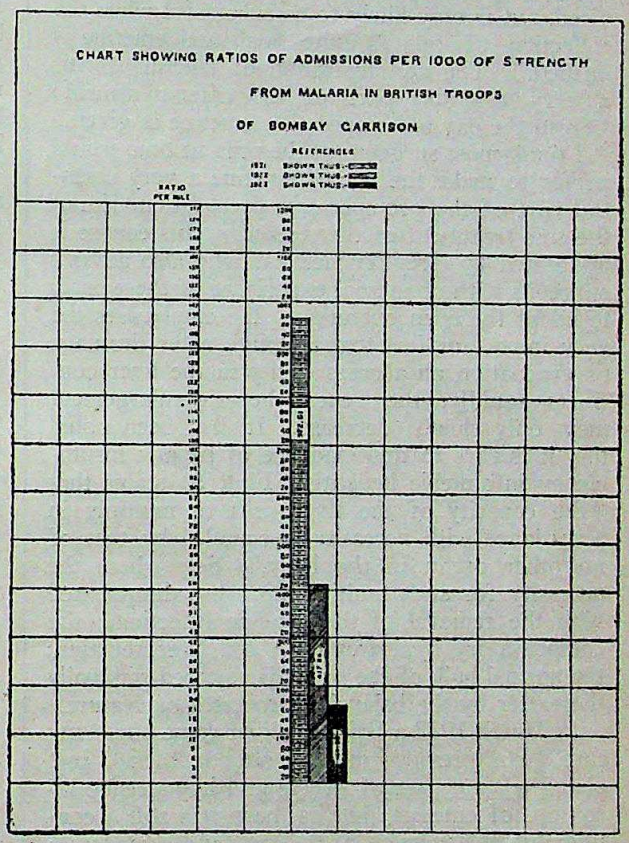
Results.—To estimate with mathematical accuracy an increase or decrease in the number of mosquitoes anywhere is perhaps an exceedingly difficult task. For the present we have to rely on the general consensus of opinion and where anophelines are concerned on the incidence of malaria in the region where anti-malarial operations are undertaken. As stated previously in this report, all the British troops in Bombay are located in Colaba, close to the reclamation area, and any increase in anophelines due to reclamation operations is very likely to tell on the malarial admissions amongst the British troops. As accurate statistics of such admissions are kept in the British Station Hospital, Colaba, the attached copy of the malarial admission chart, kindly lent to me by the Officer Commanding, British Station Hospital, gives room for encouragement (*vide* Chart II). The reclamation anti-malarial operations were commenced about the beginning of the year 1923, in close co-operation with the military and the municipal authorities, and the following figures are interesting. Ratio of malarial admissions amongst British troops per 1,000 in:—

1921	972.61
1922	417.66
1923	169.28

The general consensus of opinion, so far as can be ascertained by regular interviews with several inhabitants of upper Colaba, is very much in favour of freedom from worry by mosquitoes.

Conclusions.—To attempt to exterminate mosquitoes from whole continents or even from large rural tracts is a well nigh impossible feat. Even to suppose it possible to exterminate *every* mosquito from towns and cities requires a very high flight of imagination. But it surely falls within the scope of a practicable proposition to aim at reducing the numbers of mosquitoes as much as possible. No one considers it possible to drain or otherwise treat every breeding place of mosquitoes in any locality, but even where every such place cannot be dealt with, it will always be possible to deal with a considerable number, and it often happens that the smallest and most easily drained or emptied puddles or pots breed the greatest number of mosquitoes. As a general rule the vast majority of mosquitoes existing in any locality are bred in the immediate surroundings of that locality, and if we get rid of these breeding places we may calculate on at least greatly reducing the insects in that locality.

CHART II.



On the application of these principles we have based our efforts, and in the plan of action adopted, we have as far as possible avoided confused councils, divided authority and delayed execution.

References.

1. Notes on Back Bay Reclamation by Sir George Buchanan, C.I.E., M.I.C.E.
2. Inspection reports of Lieut.-Colonel S. R. Christophers, C.I.E., I.M.S., on Back Bay Reclamation and Malaria.
3. Dr. Bentley's report on "Malaria in Bombay."
4. Proceedings of the Sanitary Committee of the Back Bay Reclamation Scheme.
5. Quarterly malaria reports of Capt. B. S. Chalam, on the Back Bay Reclamation anti-malarial campaign.

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THE SPONTANEOUS ABSORPTION OF AMŒBIC ABSCESS OF THE LIVER UNDER EMETINE THERAPY.

By A. SARGOOD FRY,

CAPTAIN, I.M.S.

In a recent authoritative work on tropical medicine(1) in the section on amœbic abscess of the liver, emetine is said to have "robbed the surgeon of much of the surgery associated with amœbic inflammations of the liver, which, in any degree short of an actual abscess, will almost certainly yield to this treatment. If an abscess appears to be forming, or has already formed, operation is necessary." The writer prefers an open operation, although he remarks that "simple aspiration, which may be repeated several times, is also advised, but is only likely to be successful when the collection of pus is quite small and emetine is pushed." The administration of emetine forms a very essential part of the after-treatment; "from the day after operation emetine is given."

I think most surgeons at the present time would prefer to make the use of emetine a very essential part of the pre-operative preparation, if not the sole treatment of the disease. This course is advocated by Grey Turner(2), who also advises surgeons with no special experience of these cases to adopt the open operation. He emphasises the very important fact that although after drainage or evacuation an abscess cavity in the liver contracts rapidly, the general hepatic enlargement may only slowly decrease. It has been noted that it is rare to find evidence of hepatic insufficiency in amœbic hepatitis. Flint(3) states that "the capacity of the liver cells to multiply in accordance with necessity is equalled by that of no other organ in the body." So, when the necessity for such multiplication has disappeared with the removal of the amœbic infection, the compensatory hypertrophy of the liver remains; the normal bulk of the organ is restored gradually thereafter by the balancing processes of Nature.

In March 1922 a British soldier came under my care. His previous medical attendant had just completed a course of twelve gr i hypodermic injections of emetine; but as there was still a considerable enlargement of the liver and a moderate leucocytosis (16,250) I deemed it wise to explore. With the aid of general anæsthesia an abscess cavity was located in the right lobe of the liver by means of an aspirating needle introduced in the seventh interspace in the right mid-axillary line. Aspiration withdrew, drop by drop, a little thick, shreddy pus. As this seemed unsatisfactory, I cut down on the abscess and found a small cavity with soft, shreddy walls, containing about two ounces of thick, glairy pus. A month later the patient was discharged from hospital very fit and well, and his liver dulness was within normal limits. However, he could have done very well without the operation.

Discussing abscess of the liver, Holt(4) writes: "Cases have been reported where, after undoubted evidences of abscess have been present, recovery has followed the use of emetine alone. Without operation, however, the chances of recovery are slight. A small number of cases have been cured by aspiration, but in the vast majority of abscesses due to any cause, only incision and drainage are to be depended upon, and if the abscess is accessible, should be resorted to as soon as the diagnosis is established."

An official pronouncement on this subject runs as follows(5):—"When, however, pus is suspected or discovered, reliance should not be placed on drugs, for the expectant emetine treatment has been known to fail."

Summaries of recorded cases of amœbic abscess of the liver cured by emetine therapy will be found in the volumes of the *Tropical Diseases' Bulletin*. In some cases the diagnosis has been confirmed by needle puncture of the liver and withdrawal of a specimen of pus. In others this measure has not been carried out. Reviewing a paper by Panaystatore reporting thirty-four cases of amœbic hepatitis, Manson-Bahr writes as follows(6):—"In view of the small number of cases of amœbic abscess previously reported (about twelve in all) in which the diagnosis was rendered absolute by exploratory puncture and which were subsequently cured without operation, the three other similar instances quoted in this paper are particularly valuable. On the other hand the twenty-eight surgical cases had been treated medically with emetine injections for a week without any perceptible improvement. The leucocyte count in these cases gave no assistance, for the leucocytosis differed in no way from that of those which were cured without surgical interference. Naturally emetine has no effect upon abscesses, either of large dimensions, or when small multiple foci are present." Later(7) he comments on a paper by V. S. Hodson on the "Treatment of Hepatic Abscess with Emetine"(8) and gives his opinion that "it has yet to be shown that a really large accumulation of pus in the liver will absorb by the action of emetine alone without aspiration." In reply(9) Hodson gave his views on the rationale of emetine treatment of established abscess, together with his opinion that aspiration is not necessary in certain cases to establish the diagnosis of abscess. He suggests that so long as amœbæ are alive in the wall of an abscess there is a centripetal flow of exudate from the hyperæmic zone around the abscess towards the abscess cavity; but when the amœbæ have been killed the current becomes centrifugal as regards the now inert abscess. Later still, Manson-Bahr reviews the literature on dysentery of the last six years(10) and records that "Dopter states that there is no evidence that this drug (emetine) assists in the absorption of liver pus—evacuation is absolutely necessary."

Ludlow recently reported from Korea on one hundred operations for liver abscess between 1912 and 1922, (11). "All of our cases have come to the dispensary or hospital with well developed

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and for the most part long standing abscesses. These, of course, necessitate some form of operation. He gives a preliminary treatment by emetine, subcutaneous injections daily for two to four days, provided the patient's condition will permit of that much delay. In several cases he failed to obtain pus by aspiration, or obtained only a small quantity of thick pus and subsequently deemed it necessary to cut down and evacuate the abscess, in each case finding a large quantity of thick pus. He remarks, in fact, that emetine does not thin out pus. On the contrary it thickens the pus, rendering it viscid and difficult to aspirate. As Hodson has pointed out, this action is due to the death of amœbæ and the consequent change in the direction of the exudate current. The watery element of the abscess is absorbed more quickly than the solid elements.

On the other hand Sir Leonard Rogers describes his method of aspiration combined with emetine therapy(12) as bringing about "more rapidly and far more frequently the formerly rare natural encystment of amœbic abscesses, by destroying the causative protozoal parasite in its walls, and by removing with the aspirator the dead detruitus in the form of pus, which becomes steadily thinner and less in quantity with each evacuation in successful cases, until the remaining small quantity of fluid becomes encysted." He also relates in the lecture how Thurston injected "a grain of emetine subcutaneously immediately after aspirating with the idea that it will be carried through the wall of the abscess, where the amœbæ are living, during effusion of serum into the cavity following the relief of tension by the evacuation of the pus." It appears, therefore, that early aspiration carried out before or with the first emetine injection so alters the conditions of tension within the abscess as to prevent or retard the reversal of the exudate current described by Hodson.

Sir Leonard Rogers(13) has drawn the very instructive analogy between tuberculous and amœbic abscesses and has illustrated sufficiently the effects of emetine on amœbic abscesses. He has related conclusive evidence(14) that formed single or multiple liver abscesses can be cured by simple drug treatment, and he states that "cases have also been recorded of patients refusing operation for obvious pointing liver abscess, who eventually recovered under emetine without operation, the abscess gradually subsiding, although in such cases it is clearly advisable to hasten the recovery by removing the sterile pus by aspiration."

As regards tuberculous abscesses, Calot(15) states that nearly half of tuberculous abscesses are reabsorbed if the patient is given complete repose and good general treatment. He prefers, in spite of this, to attack such abscesses by puncture and injection of modifying liquids, because he believes that spontaneous absorption leaves an unextinguished focus of infective germs. Such an objection would not apply to amœbic abscesses. Jones and Lovett(16) estimate that "in probably 70 per cent. of cases tuberculous abscesses are absorbed if let alone, and the absorption of such collections is not detrimental in any way to the patient, but is an indication of repair." The conservative treatment of tuberculosis is an excellent illustration of present day therapeutics, whereby endeavour is made to aid the human body and to allow the human body to effect its own cure, instead of attacking directly the various gross manifestations of disease in that body as they arise. The more it becomes possible to apply this principle to this and to other diseases, the greater will be the benefit to suffering humanity in general and our patients in particular.

The two following cases are reported in which it may be presumed confidently that large abscesses were present, in the second case, I think, very large. It has been objected that in no case is the diagnosis absolutely certain without a demonstration of the pus by puncture and aspiration. This procedure, in my opinion, would have been an unnecessary refinement in these two cases. I purposely omitted it in order to exclude any complicating factor in the treatment. The clinical recoveries in each case may be attributed solely to the effects of emetine. Moreover, if one introduced a needle into the abscess, it would be difficult, I think, to refrain conscientiously from evacuating a considerable amount of pus. It may be objected that convalescence will be prolonged unduly by allowing the patient to absorb his own pus. One must remember, however, that the general health of a patient with a large abscess is very seriously deteriorated; and apart altogether from the abscess he will require many weeks to recuperate. Even as spontaneous absorption of a tuberculous abscess occurs without detriment to the patient, so, I believe, these cases show that the same occurs in an amœbic abscess. The old risk of hæmorrhage from puncture of the liver can now be countered effectively by the preliminary use of emetine. There remain for consideration the few recorded cases(17) of death from syncope, apparently due to sympathetic reflex, which have occurred within a few minutes of simple puncture of the liver with an exploring needle, without any hæmorrhage. From the patient's point of view the omission of liver puncture is, I think, a distinct gain; and it has been seen how emetine therapy results in such a thickening of the pus as to interfere seriously with efficient aspiration through ordinary needles, unless it is carried out from the very commencement of treatment. If I may borrow for my own purpose some of Sir Anthony Bowlby's words, quoted by Sir Clifford Albutt(18), I would say that the glory of emetine is that it has abated surgery; it does surgery without surgery.

The first case was evidently more chronic than the second case and the active disease, judging from the temperature chart, was cured dramatically. The pathological processes probably extended down to the neighbourhood of a

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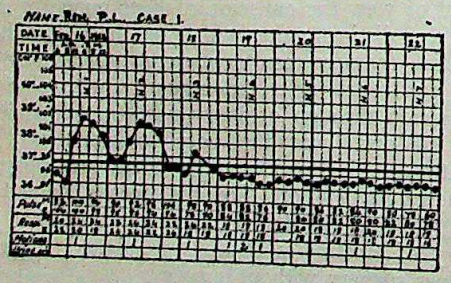
retrocæcal appendix and the ensuing fibrotic changes may have resulted in a kinking of the appendix which brought about the later complication of appendicitis. The second case appears to have been more acute, with, perhaps, a heavier infection; the continuance of the pyrexia would certainly have caused more uneasiness, and perhaps, a resort to further methods of treatment, if we had not observed a very clear and progressive improvement in the general condition of the patient, as evidenced by his improved appetite and sense of well-being.

Case 1.—Gurkha Rifleman P. L., age 26. Admitted to hospital February 14th, 1923, complaining of a painful, tender swelling in the right side of the upper abdomen. The pain began three months ago while he was on leave in Nepal; shortly after he began to suffer from feverishness in the evenings, accompanied by shivering sensations. The fever subsided regularly in the early mornings with free perspiration. The pain was also referred to the point and front of the right shoulder. His previous health had been good except for a feverish attack in 1918. No history of diarrhœa or dysentery. He drinks a daily ration of country spirit and rum.

Condition on admission.—Marked emaciation and anæmia. No jaundice. Tongue moist and clear. Sudaminal rash on front of trunk. The right loin is occupied by a large, smooth, firm, immobile, tender swelling as indicated in the photograph (No. 1). From this swelling the antero-inferior liver margin can be traced upwards to the left costal margin and is tender. No tenderness in the right subcostal angle. No enlargement of the spleen can be made out. The lower four intercostal spaces bulge behind on the right side in marked contrast to the well marked depressions elsewhere. The deep dulness of the upper margin of the liver was defined at the fifth rib in the right mid-clavicular line and the sixth interspace in the right mid-axillary line. The urine contained no abnormal constituents. The lungs and heart were healthy. The stools contained segments of tape-worm. The patient was screened with X-rays and free movement of the left side of the diaphragm seen to be present. The right side was, however, immobile and presented a marked upward dome-shaped projection reaching the level of the nipple, corresponding to the fourth rib. The condition was diagnosed as amœbic abscess of the right lobe of the liver, pointing downwards along the ascending colon.

The patient was put to bed and emetine hydrochloride gr. i given by subcutaneous injection daily until gr. xii had been administered. The first injection was given on the 16th of February. The effect on the temperature will be seen to have been dramatic.

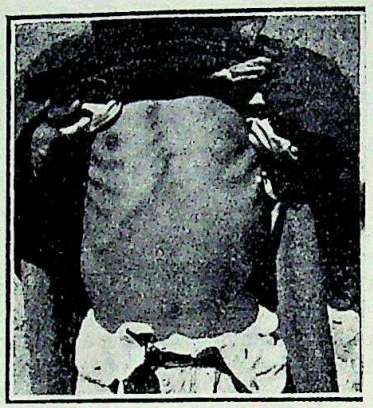
CHART I.



Case I.—H = Hypodermic injection emetine hydrochoride gr. i.

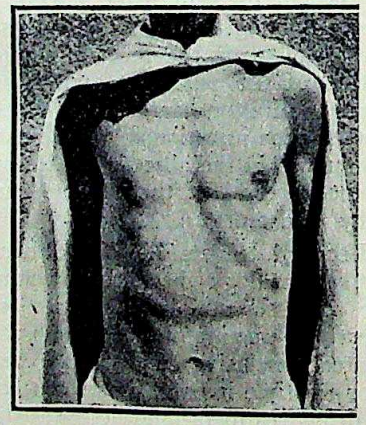
Later in the convalescence the helminthic infestation was eradicated. The sweating ceased to trouble the patient with the subsidence of pyrexia. A few days later the pain in the shoulder vanished. Appetite improved and the patient gained steadily in weight. The pain and tenderness in relation to the abdominal swelling soon became negligible but had not completely disappeared until about a month after the commencement of treatment. The patient was screened on March 12th and the right side of the diaphragm seen to be moving freely. The upper percussion limits of the liver were normal. The abdominal swelling gradually became less and had vanished completely by the time of the patient's discharge from hospital on April 17th, 1923.

PHOTO. I.



Case 1 (*a*) February 14th, 1923. Photograph on Admission.

PHOTO. II.



Case 1 (*b*) September 3rd, 1923.

The patient returned to his regiment and fulfilled his duties until August 11th, 1923, when he was readmitted to hospital in a first attack of acute appendicitis. He refused operation and recovered. After the subsidence of local rigidity a mass became palpable in the appendix region which gradually became absorbed. During his convalescence he was found to be harbouring ankylostomes, for which suitable treatment was administered successfully. He was discharged to duty on September 17th.

Weight in hospital clothing.

February 28th, 7 st. 10 lbs.
March 5th, 8 st. 12 lbs.
March 12th, 9 st. 0 lb.

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March 19th, 9 st. 7 lbs.
April 12th, 10 st. 1 lb.

CASE 1. BLOOD EXAMINATIONS.

DATE.	Parasites.	Total R.B.C.	Total W.B.C.	DIFFERENTIAL COUNT %.		
				Polymorphs.	Large mono-nuclears.	Small mono-nuclears.
Feb. 14th 1923	Nil	..	..	..	..	..
Feb. 15th ,,	Nil	..	..	65	28·8	6·2
Feb. 16th ,,	..	3,233,280	12,344	71·1	13·2	15·7
Feb. 19th ,,	..	4,183,328	7,812	56	28	16
Feb. 26th ,,	..	5,168,000	14,400	58·7	26·1	15·2
Mar. 3rd ,,	..	..	11,500	56·8	24·3	18·9
Mar. 23rd ,,	N	5,500,000	5,000	..	..	..

Case 2.—Gurkha Rifleman G. S. R., age 25.

Admitted August 25th, 1923, complaining of fever of ten days' duration, with headache and generalised aching in the body, and particularly pain in relation to the right hypochondrium, right side of the chest and right shoulder. No history of dysentery or diarrhœa. On examination the patient shows marked emaciation, anæmia and weakness. He is unable to walk. The inferior liver margin is not palpable or tender. The tongue is moist and dirty. No enlargement of the spleen can be detected. The right of the thorax bulges distinctly and shows very markedly diminished respiratory movement. Hemicircumference of the thorax at the level of the ensiform cartilage measured 1¾ inches more on the right than the left side. The apex beat of the heart was visible just internal to the left nipple in the fourth interspace. No dilated surface veins. No jaundice. The height of the liver dulness in the right lateral line measured 11½ inches. The deep percussion dulness reached the upper border of the second rib in front; the superficial dulness reached the fourth rib. The deep dulness crossed the apex of the axilla and the

CASE 2.

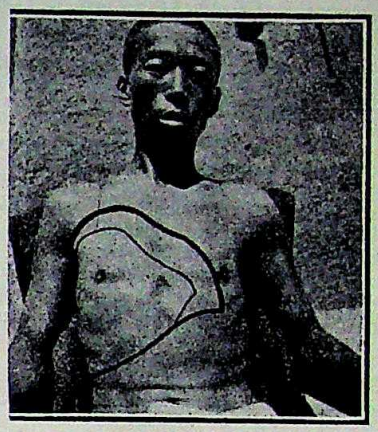
The heavy line denotes limit of deep percussion dulness. The light line denotes superficial dulness.

PHOTO. III.

Case 2 (*a*) August 30th, 1923. Note: patient leaning over to right side.

back of the chest at the level of the root of the scapular spine. The right lung showed very deficient air entry. There was no cough. The appetite was poor. The urine was found to contain a few epithelial cells, white blood corpuscles and hyalo-granular casts. The stools contained ova of *Ascaris lumbricoides* and ankylostomes but no amœbæ or cysts.

PHOTO. IV.



Case 2 (*b*) September 24th, 1923. Patient is now able to sit up straight.

PHOTO. V.

Case 2 (*c*) October 31st, 1923. Patient full of vigour; up and about.

A diagnosis was made of amœbic abscess of the right lobe of the liver, producing great compression of the right lung. X-rays confirmed this finding. The sole treatment was a course of emetine hydrochloride gr. i daily hypodermic injections until gr. xii had been given. Later in convalescence the helminthic infestation was eradicated. The injections were commenced on August 30th and within a week the patient felt very great relief and clamoured for satisfaction of a ravenous appetite. The pyrexia continued accompanied by slight shivering sensations and moderate sweatings, but with remarkable absence of constitutional symptoms. Within three weeks the patient was up and about, feeling a different man. He was discharged from hospital on November 2nd. He felt very fit and well, looked well nourished and only complained of vague discomfort in the right chest. The heart borders were normal. The air intake of the right lung was much improved, but expansion of the right side of the chest was still less than that of the left side. The urine contained no abnormal constituents. The hemicircumference of the thorax at the level of the ensiform cartilage was ¼ inch more on the right than on the left side. The height of the liver dulness measured 7½ inches.

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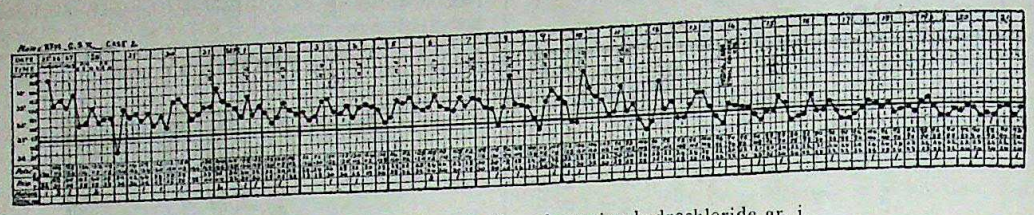
CHART II.



Case II.—H=Hypodermic injection of emetine hydrochloride gr. i.

His weight on admission was 7 st. 11 lbs. and on discharge 8 st. 2 lbs. This patient was invalided out of the army by a medical board during February 1924 on account of breathlessness on exertion, which may be attributable to residual pleuritic thickening and adhesions over the right lung. At this time the upper limit of liver dulness was defined at the upper border of the fourth rib at the level of the nipple.

Case 2. Blood Examinations.

Date.	Parasites.	Total W.B.C.	Differential Count%.			
			Polymorphs.	Large mononuclears.	Large lymphocytes.	Small lymphocytes.
Aug. 30th, 1923	Nil	5,625	..	..	..	..
Aug. 31st, ,,	Nil	7,812	46·5	22·0	10·0	13·0
Sept. 8th, ,,	Nil	..	73·0	8·3	16·0	2·7
Sept. 10th, ,,	Nil	..	72·6	5·8	13·0	8·6
Jan. 16th, 1924	Nil	7,000	74·0	8·0	16·0	2·0

Note.—Unfortunately no red cell count was recorded in this case, but the blood was very watery and pale.

Conclusions:

1. Two cases of large amœbic abscesses of the right lobe of the liver are reported in which the clinical diagnosis was sustained by X-ray examination but without exploratory puncture of the liver.

2. Clinical cure of both patients with complete absorption of the abscesses was attained by the administration of emetine hydrochloride hypodermically.

3. Co-existent helminthic infestations required eradication in both patients.

4. The spontaneous absorption of a large sterile abscess is in no way detrimental to a patient; on the contrary his general health improves concurrently.

5. It appears probable that aspiration could be dispensed with in many such cases without detriment, and I think, with advantage to the patient and his medical attendant. I suppose that many practitioners at the present time are so treating these cases.

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THE PROBLEM OF CURE IN KALA-AZAR.*

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One of the most difficult problems with which the practitioner is faced in the treatment of kala-azar is to know when the patient can be considered cured and the antimony treatment discontinued. From time to time since the introduction of the treatment with the antimony tartrates various rules have been suggested for the course of treatment that is necessary to effect a cure; these rules have become more and more elastic and there is usually a very decided tendency towards prolongation of the course. Sir Leonard Rogers first suggested that the injections

* Received for publication 5th March 1924.

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should be continued until there was a decided general improvement and the temperature had been normal for at least a month, but he subsequently (1919) increased this time to two months. Brahmachari (1920) suggested that the treatment should be continued for several weeks after the fever had subsided, until there had been a decided increase in weight and until the blood picture had returned to normal. Muir (1918) said that a course of 4 months was necessary to ensure cure, but Napier and Muir (1923) modified this by suggesting that if the temperature becomes normal within the first two weeks of the commencement of treatment, this should be continued for two months; that if this reaction to treatment is delayed for three weeks, the treatment should be continued for three months, and that if the fever continues for longer than four weeks, the treatment should be continued for four months. These writers advocate the giving of injections every other day so that their minimum is 2.55 grammes in 30 injections. Knowles (1920) working at Shillong found that in a series of 46 cases a total dose of 2 grammes of antimony tartrate "sterilised" all his patients. Mackie (1923) also working in Shillong, treating mostly cases that had previously received treatment and including some definitely resistant cases found this dose (2 grammes) insufficient in 58 per cent. of his cases and concluded that all cases must be treated on their merits, and that only spleen, or liver puncture with culture of the material could be accepted as the final test for cure.

It is quite obvious that this last means of testing the "sterilization" of a patient is not only impracticable in 99 cases out of a hundred in the country districts of Bengal and Assam, but further than this, it does not seem quite certain that as a means of testing cure it can be accepted as the last word on the subject.

There are a few cases in this series in which a culture of spleen material did not show any growth of flagellates on N.N.N. medium; in which errors in technique or the chance of reinfection can safely be excluded; but which relapsed. Knowles also heard after the publication of his paper (1920) that some of the cases that he treated in Shillong and returned as cured on the strength of a negative spleen puncture culture had subsequently relapsed. On the other hand, there are two cases in this series in which flagellates were grown in the one case from the blood and in the other from the spleen puncture material at the time they left hospital who, although they have received no further treatment, have had no return of fever and were seen to be in perfect health 18 months later. The first case was an orphanage girl who had 10 days fever; the blood was taken for culture, but as the fever subsided she was sent out to make room for another patient. Flagellates were grown from the blood but opportunity did not arise for her re-admission for some time. She was in perfect health by that time, so it was decided that she should not be admitted to hospital until further symptoms appeared. She has been in perfect health ever since and a second blood culture taken a year after the first was negative. The second case was an Anglo-Indian adult who had received 17 injections amounting to a total of 1 gramme. He was anxious to be discharged, so a premature spleen puncture was done; no parasites were seen on the smears but a growth of flagellates was obtained. He nevertheless insisted on being discharged. He has been to see me from time to time as he lives in Calcutta; his spleen is not palpable and he has had no return of fever although he has had no further treatment. It is now 18 months since this case left hospital.

Thus, the last hope of any absolute certainty in the matter of deciding when treatment is to be discontinued seems to have been taken away and we must be content with something less than this. It is a simple matter to suggest that each case must be treated on its merits, but from the point of view of the general practitioner, who has to judge these merits from the clinical standpoint, it is very important to have some rule by which to work, either as to the total number of injections that should be given, or the clinical conditions that should be attained before treatment can be discontinued. With the object of formulating some such rule, I analysed all the case sheets of cases treated under my charge in the Carmichael Hospital for Tropical Diseases, Calcutta, during the year 1922.

The Cases.

During the year 153 cases of kala-azar were discharged from or died in the hospital; these can be divided as follows:—

Admitted in a hopeless condition and died without receiving any specific treatment	14
Admitted in a very bad condition and died after being treated with antimony tartrate as a last resort	6
Moderately advanced cases that died during treatment	14
Discharged cured	92
Left hospital before treatment was completed	27
Total ..	153

Deaths.

The total number of deaths was 34, or 22.2 per cent. of all cases.

(This figure includes cases who received no specific treatment.)

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The number of deaths for treated cases was 20, or 14.4 per cent. of treated cases.

If the six cases which were admitted *in extremis* and to which injections of antimony tartrate, usually not more than 2, were given as a last resort are deducted, the number of deaths is reduced to 14 and the death-rate for treated cases which on admission had a reasonable chance of survival is 10.5 per cent.

The cause of death in the three classes of cases, i.e., (*a*) cases that had no treatment, (*b*) cases that were treated as a last resort, (*c*) other cases, was as follows:—

	a.	b.	c.	Total.
Bowel complications ..	2	1	4	7
Pneumonia	2	–	2	4
Cancrum oris, etc.* ..	2	2	2	6
Hyperpyrexia ..	1	1	3	5
Other causes	7	2	3	12
	14	6	14	34

These figures do not indicate that any particular complication was induced by treatment, with possibly the one exception of hyperpyrexia. Certainly five treated cases died of bowel complications but this is a very common terminal condition which was sometimes entered as the cause of death in the absence of any other definite symptoms.

The Treatment.

The presence of the parasite was demonstrated in every case before treatment was commenced.

An initial dose of 0.5 c.c. of a 2 per cent. solution was given and each dose was increased by 0.5 c.c. until the maximum had been reached; after this the maximum dose was given on each occasion. The maximum for an adult was 5 c.c. and for an infant of 2½ years it was 2 c.c.; the dosage for the intermediate ages ranged between these two. The injections were given on alternate days. Except in a few instances intravenous injections were given.

Every case (with one or two exceptions) was given in the first place 30 injections, but for subsequent dosage no absolutely fixed rule was observed. If the patient's temperature had responded rapidly to the treatment this was usually discontinued after the 30th injection, but if the fever had continued until about the 15th injection, the treatment was usually extended to 35 or 40 injections; in more obstinate cases it was extended even further. The spleen puncture to confirm the cure was not done until we were satisfied on clinical grounds that the patient was cured; in a certain number of instances this spleen puncture was "positive," and in these treatment was continued for another 10 to 15 injections before another spleen puncture was done. In every case the spleen puncture material was placed on N.N.N. medium and unless at least one tube from each case remained sterile for 10 days it was not considered to be a satisfactory spleen puncture; consequently in some cases in the tables it will be noted that a "negative" culture is not recorded.

Although it is difficult to understand how a case could relapse after apparently so crucial a test, nevertheless, as I have already mentioned, two of the cases (No. 85 and 108) showed no parasites in their spleen puncture smears nor did any flagellates develop from the spleen material after a perfectly satisfactory incubation on N.N.N. medium. The chance of reinfection could be excluded in one case and was very small in the other; the former had spent his convalescence in a kala-azar-free district and the latter, who relapsed within four months, in Calcutta, but not in the highly infected area.

It seems obvious that even this laboratory test cannot be taken as final. I, therefore, decided that final clinical cure as evidenced by the after history of the patient would bring one nearer to the truth and the criterion of cure that I have adopted in this analysis is that the patient shall have remained in good health and quite free from fever for a period of six months from the time of discharge from hospital. A very large percentage of cases have gone back to an endemic area after their discharge from hospital, so that the possibility of reinfection has to be considered, but the choice of six months only as the period of observation reduces to a minimum the chance of confusion from this factor.

A number of the cases were Calcutta residents and by encouraging these to attend this institution for their minor aliments it has been possible to get into touch with most of them; others I myself traced with the aid of the Corporation's Assistant Health Officers. Reliable information from relatives was often obtained about a *mofussil* patient, but for the most part information about the fate of these patients was obtained by means of a reply postcard sent to each patient. Addresses were not always very carefully recorded and in some instances only the temporary Calcutta address was noted on the Ward case sheet so that the fact that in 23 cases no information is available is not surprising. I do not think that there is any indication that this figure includes an undue proportion of 'deaths' as relatives are usually very ready to report a death and did so in a number of cases. If the patient was reported to have died he was entered as a 'relapse.'

* One case died of œdema of the glottis.

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Of the 119 cases that left hospital the subsequent history of 96 is known and is as follows:—

	Subsequently proved cured.	Subsequently relapsed.	No information.	Total.
Complete course of treatment ..	75	5	12	92
Incomplete course of treatment ..	6	10	11	27
Total ..	81	15	23	119

Details of the treatment and result of this treatment of the 96 cases are given in the following four tables.

Table A. Cases that had a full course of treatment and were cured.

Table B. Cases that had a full course of treatment but relapsed.

Table C. Cases that had an incomplete course of treatment but were cured.

Table D. Cases that had an incomplete course of treatment and relapsed.

Analysis of the Tables.

The cases can conveniently be divided into five age groups:—

(*a*) Patients less than 5 years of age.
(*b*) " " " 10 " but over 5.
(*c*) " " " 15 " " " 10.
(*d*) " " " 20 " " " 15.
(*e*) " of 20 years or over.

Dosage.

Table A. (The last five cases are excluded as they had special* treatment.)

Age group.	Number.	Actual dose in grammes. Minimum.	Average.	Maximum.	Relative dose in grammes per 100lbs. Minimum.	Average.	Maximum.
(*a*) ..	1	..	1·1	..	..	5·5	..
(*b*) ..	8	1·56	2·5	3·3	4·46	6·47	8·68
(*c*) ..	12	1·535	2·55	3·76	2·65	5·04	6·9
(*d*) ..	17	2·12	2·9	4·0	2·67	4·0	7·14
(*e*) ..	32	2·04	3·0	4·3	1·75	3·125	7·11

The average relative dose for the whole 70 cases was 4·08 grammes.

* See note at foot of Table A.

Table B.

(*d*) ..	2	4·14	4·24
(*e*) ..	3	4·3	4·17

The average relative dose for the 5 cases was 4·2 grammes.

Case No. 87 is the only one that could have been considered to have received too little treatment; although his dose was well above the average for cured cases, his relative dose was just under the average for his age group.

Cessation of fever.

The temperature is probably the best indicator of the condition of the patient and of his progress towards recovery. The interpretation of the temperature chart is not, however, always quite easy. If the temperature remained high up to a certain point and then fell permanently to normal, rules could be made for the length of continuance of treatment in direct relationship to the length of time the patient had been free from fever; but this is, unfortunately, not the case, and many patients continue to run an irregular fever, though otherwise progressing very favourably, throughout the course of treatment.

For purposes of analysis I have classified the cases of Table A according to the behaviour of their temperatures into the following classes:—

(1) Afebrile cases, i.e., cases who had no fever during their stay in hospital 4
(2) Cases whose temperature fell to normal and remained normal subsequently 37
(3) Cases whose temperature fell to normal and remained normal for some time but whose charts subsequently showed an occasional rise .. 25
(4) Cases in which the temperature was irregular throughout .. 2

In order to simplify classification the number of injections that were administered in each case before the fall of temperature is analysed instead of the actual amount that the patient had received. Classes (2) and (3) are analysed separately and the age groups are still observed.

Age group.	Class (2). No. of cases.	Class (2). No. of injections to fall of temperature; average.	Class (3). No. of cases.	Class (3). No. of injections to fall of temperature; average.	Total. No. of cases.	Total. No. of injections to fall of temperature; average.
(*a*)	—		1	10	1	10
(*b*)	4	7·5	2	12·5	6	9
(*c*)	3	12·6	8	14	11	13·5
(*d*)	12	13·6	4	23	16	16
(*e*)	18	15·3	10	16·4	28	15·7
Total	37		25		62	

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This somewhat arbitrary procedure that I have adopted in noting that the temperature fell to normal at a certain point, and ignoring subsequent irregularities, is open to criticism, but if the temperature is to be used as a criterion of cure (and I am of the opinion that read intelligently it is the best criterion) absolutely rigid rules cannot be adhered to. If it were ruled that the temperature must remain normal even for as short a period as one month before the treatment could be discontinued, many cases would be under treatment more or less indefinitely. Only 37 cases, other than the afebrile cases, would have passed this test; the 27 cases whose temperature was not regular were nevertheless cured. The fact that these cases were cured was not because they were given a much longer course of treatment; as a matter of fact they received an average of 37 injections against an average of 36 for all the cases.

The temperature in untreated kala-azar tends to run in waves and during the course of treatment these waves are only slightly modified, so that there is a danger of the trough of the wave being mistaken for the true fall of temperature. After these temporary falls the temperature usually reassumes its previous form, possibly slightly modified, that is to say, the daily remittent or intermittent form which is very different from the irregular temperature referred to above which only amounts to an occasional rise lasting a few hours.

The relapse cases (Table B) stand out in very marked contrast to the cured ones. One case was febrile throughout and the average number of injections to the fall of temperature in the other four was 39, and even then the temperature was not subsequently absolutely normal. The average number of injections that these cases received was 51.

Up to the present I have made no distinction between the different salts of antimony tartrate that were administered. Twelve cases were given potassium antimony tartrate; the average number of injections before the temperature fell was 15.4 in these cases. In five cases we used the triple salt, sodium-potassium-antimony tartrate; in these the average number of injections to the fall of temperature was only 9.2 against 14 which is the average number of injections for all forms of treatment for patients of these ages. Although I am under the impression that the triple salt gave the best results, I cannot claim that so small a number of observations goes far to prove the definite superiority of this over other salts of antimony.

The Size of the Spleen.

The sizes of the spleens of the 75 cases in Table A before and after treatment were as follows:—

	Before treatment.		After treatment.		
	Number of cases.	Average size in inches.	Number of cases.	Average size in inches.	(Average size of these before treatment.)
Measurably enlarged.	72	5·43	33	2·3	6·3
Palpable, to costal margin.	2	..	30	..	4·74
Not palpable ..	1	..	12	..	3·1

Table B:—All had measurably enlarged spleens before treatment, the average size of which was 6 inches. After treatment 3 were still measurably enlarged with an average size of 4.16 inches and two were palpable.

Tables C and D:—Before treatment, the spleens of these cases were all palpable and with the exception of three were measurably enlarged.

	Number.	Average size in inches below costal margin.	
		Before treatment.	After treatment.
Table C ..	4	4·25 ins.	2·5 ins.
Table D ..	9	6·0 „	5·6 „

Nearly all the cured cases showed a very decided reduction in the size of their spleens; spleens that had been previously only slightly enlarged could not be felt; those that had been moderately enlarged became level with the costal margin and those that had been markedly enlarged were projecting a few inches only below the costal margin. Some of the relapse cases showed a very decided reduction in the size of their spleens, but on the whole the reduction in these cases was very much less than in the cured cases.

Weight.

Table A:—71 out of the 75 cases increased in weight during their stay in hospital.

The average of the difference in weight of the 75 cases was + 9.6 lbs. increase.

The mean increase of the 71 cases was:—

All ages .. .. 10.4 lbs. ± 6 lbs.
Ages under 15 years (Groups *a* *b* and *c*) .. .. 7.6 lbs. ± 5 lbs.
15 years or over (Groups *d* and *e*) .. .. 11.6 lbs. ± 6 lbs.

The mean decrease of the 4 cases was:—

All ages .. .. .. 4.9 lbs.
Ages under 15 years .. .. 2.75 lbs.
15 years or over .. .. 7 lbs.

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Table B:—Three out of five cases increased in weight, one only showing an increase over the average.

The average difference in weight of these five cases was 4.35 lbs. increase.

THE BLOOD COUNT.

Table A.

White Blood Count, Total.

	Number of cases.	Mean.
Before treatment	.. 59	3,624 per c.mm.
After treatment	.. 66	7,340 per c.mm.

	Before treatment.	After treatment.
Under 2,000 per c.mm	4 or 6.7%	Nil.
Under 3,000 „ „	.. 25 or 42.4 %	Nil.
Under 4,000 „ „ and	.. 38 or 64.4 %	1 or 1.5%
Over 4,000 per c.mm.	.. 21 or 36.6%	65 or 98.5%
Over 6,000 „ „	.. 2 or 3.4 %	50 or 75.75%

Table B:—Only one case had a blood count of over 6,000 per c.mm. on discharge.

Eosinophiles.

Table A:—Fifty cases had a differential count done before and after treatment.

The number of eosinophiles was increased in 35 cases, was decreased in 9 cases and remained unchanged in 6 cases.

Before treatment:—Out of 65 counts, 27 showed no eosinophiles in 250 white blood cells. The mean of 65 counts was 66 eosinophiles per c.mm.

After treatment:—Out of 65 counts 16 still showed no eosinophiles in 250 white blood cells. The mean of 65 counts was 506 eosinophiles per c.mm.

Table B:—Of these five cases, two showed no eosinophiles at the end of treatment and the other three counts were all less than the average of the final count of the cured cases, but as these were all Anglo-Indians and were not suffering from ankylostomiasis these figures are of little significance.

Considering the blood counts before treatment from the point of view of diagnosis of kala-azar, it appears that a white blood count of less than 4,000 is the rule and that a count above 6,000 is very exceptional.

On the other hand it is obvious that in a cured case a count of 6,000 should be expected and that no case should be considered cured with a count of less than 4,000 per c.mm.

The eosinophile count is very useful from a diagnostic point of view; even in the presence of a general leucopœnia a mean eosinophile count of 66 is very low in a population which has a high percentage of hookworm infection. The mean eosinophile count after treatment showed a decided increase, i.e., 506 per c.mm., but from the point of view of the estimation of cure in the individual case the results were rather disappointing, 15 out of 50 cases failing to show any actual increase and therefore probably not more than half the cases showing a relative increase. It must be remembered that the helminthic infection of all these cases was treated during their stay in hospital.

Discussion.

The absolute impossibility of making one fixed standard for the course of treatment for all cases is well demonstrated by a comparison between the dosage of the cases in Table B., i.e., cases that relapsed, and those of Table C, in which some of the cases had a very abbreviated course of injections but were nevertheless cured; on the one hand doses of over 5 grammes failed to effect a cure, whereas other patients remained cured after total doses of 0.27 and 0.65 grammes and in one case after no antimony treatment at all. Even if we consider the dose relative to the weight of the patient the contrast is, though slightly less, still very great.

It will be as well to examine the dosage of these patients according to their age grouping. Group (*a*) can be left out of consideration as it only contains one case. As one would expect, the mean actual dose for each group increases with the age, but on the other hand the mean relative dose for each age group decreases very markedly with the increase in age; that is to say, there has been a tendency on our part to give children a much more thorough course of treatment. If we turn to Table B we see that not only was the mean dose of these cases greater, but each individual case received as much as or a greater amount than the mean dose of the corresponding age group of the cured cases, except in the one case that we have already mentioned; this also holds with regard to the relative doses.

There is little doubt that certain cases are resistant to treatment with the antimony tartrates. Our knowledge of the biochemistry of the body is so limited that it is not possible even to guess at the nature of the mechanism of this resistance. There is something in the biochemical composition of the body which deflects this form of antimony molecule from its goal, the leishmania parasites. Although this resistance probably exists in a varying degree in most individuals, there appears to be a line, not a very sharp line, of distinction between the resistant cases and other cases. In making rules for dosage it is obviously important that these rules should not be made in such a way as to include really resistant cases, as in this way the vast majority of cases would be subjected to an unnecessarily long course of treatment. Case No. 87 received a smaller dose than the mean dose of his age group and he has since been cured by a second course of injections; he must, therefore, be looked upon as a case that had an insufficient course of treatment;

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the other four relapse cases, however, stand out fairly distinctly from the cured cases in the amount of treatment that they received and may, I think, be looked upon as really resistant cases.

We will first examine the dosage in Table A. It must be remembered that the doses recorded in this table are not the exact doses that were necessary to effect a cure but the doses that were actually given and which did effect a cure. The relative dosage of the younger age groups was so much greater than that of the adult group that, if we can ignore the unlikely hypothesis that children require relatively a larger amount of the salt, one must assume that we gave most of the children an unnecessarily long course of treatment; we can therefore make our calculations of the curative dose from our experience with adults.

The mean relative dose of the 32 adults was 3.125 grammes with a standard deviation of ± 1.05, so that if we suggest 4.175 grammes (3.125 + 1.05) or roughly 4 grammes per 100 lbs. of body weight of patient as the maximum total dose for all cases, although we shall be giving a percentage of cases somewhat more treatment than is absolutely necessary, we shall be certain of curing practically all but resistant cases.

Modification of the dosage in certain cases:—The next point to consider is whether by studying the various pathological phenomena of the disease and the rate of their disappearance under treatment we can suggest a modification of the course in certain cases which respond to treatment more rapidly than the majority. The conditions that come under this heading are the general condition of the patient, the temperature, the splenic enlargement, the weight and the blood picture. The first named is not a classifiable condition; in every case that was discharged a distinct improvement in the general and epi dermal condition of the patients was noted, even in the cases that had not increased in weight.

That the return of the temperature to normal is a valuable criterion of the rate of progress towards cure is shown by the fact that this is very much delayed in cases of Tables B and D, i.e., cases that relapsed; but that it is not an infallible criterion is obvious from the fact that some cases are afebrile throughout their course of treatment. The most noticeable fact in the analysis of Table A is that in children the number of injections given before the fall of temperature was much less than in the case of adults, although subsequent irregularity is relatively more common. It might be argued from this that children are more amenable to treatment than adults. There is, however, the dosage factor to be considered. Although we have made a practice of varying the maximum dose according to the age and size of the patient we have not varied the initial dose, so that, relatively, the younger cases were getting very much larger doses; this may have been an important factor and rather tends to confirm my previous observation that we have been giving an unnecessary amount of treatment to the younger age groups. We will, therefore, only consider cases of 15 years or more, i.e., age groups (*d*) and (*e*).

As the average number of injections before the fall of temperature for these last two age groups is just under 16, we will divide these cases into two groups; one group will consist of cases whose temperature fell to normal before the 16th injection, and the other of those whose temperature persisted longer than this. In 27 of the 44 febrile cases the temperature came to normal before the 16th injection; in these the mean number of injections before the fall of temperature was 10.25 with a standard deviation of ± 3.5 and the mean total number of injections that they received was 33.7 with a standard deviation of ± 5.2.

In 17 cases the fever persisted after the 16th injection; in these the mean number of injections before the fall of temperature was 23.9 with a standard deviation of ± 8.5, and the mean total number of injections received was 38.8 with a standard deviation of ± 6.4.

Provided that our system of dosage for adults be followed (i.e., 0.5 c.c. increasing by 0.5 c.c. up to 5 c.c.), that the injections be given on alternate days or three times a week, that proportionate dosage for children be given and that the other criteria of cure be present at the conclusion of the course, we might suggest from the above figures the following modification of the dosage, based on the time of cessation of fever:—

In cases in which the fever ceases before the 16th injection, 33.7 + 5.2, or in round figures 40 injections, be given.

In cases in which the fever ceases before the 10th injection, 33.7, or in round figures 35 injections, be given.

In cases in which the fever ceases before the (10.25 less 3.5 or) 7th injection, 33.7 less 5.2, or in round figures 30 injections be given.

But for all cases whose fever persists after the 16th injection, the full course of 45 injections be given.

The next point to be considered is the reduction in the size of the spleen. At the conclusion of treatment only about 40 per cent. of cured cases had measurably enlarged spleens and in this 40 per cent. the spleens had been reduced very considerably in size, that is to say by at least four inches; one case

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only showed no reduction of splenic enlargement. (Two of the "subsequently relapsed" cases also showed a considerable decrease in the size of their spleens.) I think that we may rule that a very marked reduction in the size of the spleen may be expected in every case in which previously the spleen had been markedly enlarged and reduction above the costal margin in those cases in which the organ had only been slightly enlarged.

A decided increase in weight should be expected by the completion of treatment, but as this increase in weight, though a constant feature, varies very much in amount it is not possible to make any hard and fast rule.

The leucocyte count was over 6,000 per c.mm. in 75 per cent. of the cured cases, so that a count of this figure should be expected, and as all the cases but one had a count of 4,000 per c.mm. it may be ruled that a count of over 4,000 per c. mm. should be a *sine qua non* of cure.

The effect of other factors on the progress of patients.

Race and Religion.—It is a noticeable fact that (except for one who was a European) all the cases of Table B were Anglo-Indians, and that out of 23 Anglo-Indians that came under treatment 8 relapsed. This suggests very strongly that the Anglo-Indian is usually more resistant to treatment than the Indian.

Relapsed and incompletely treated cases.—Out of six cases who had had a full course of treatment previously and had relapsed, five were cured under our treatment; these required an average of 3.6 grammes of antimony tartrate which is distinctly less than the average dose for cases of the same age groups. Of the 13 cases who had previously had irregular treatment, not amounting to a proper course and usually in insufficient doses at too long intervals, three were discharged cured but relapsed, 4 had various amounts of treatment (average 2.6 grammes relative dose) but were not cured, and 6 had an average dose of 5.9 grammes and were cured. It appears, therefore, that cases that relapse after having had a proper course of treatment and being apparently cured are easily amenable to treatment again, but those cases that have had irregular treatment are liable to show distinct signs of resistance to treatment.

Length of duration of the disease.—In 24 cases of Table A in which the length of duration of the disease prior to the commencement of treatment was less than 6 months the average total dose was 4.44 grammes; the average dose for the corresponding age groups is 4.35 grammes. Furthermore three out of the five cases of Table B had a history of less than 6 months duration. It appears, therefore, that cases in which the disease is treated at a comparatively early stage are not more amenable to treatment than those in which the disease is well established.

Summary.

(1) There are no absolute criteria of cure, either clinical or otherwise; the only satisfactory evidence of cure is the subsequent history of the patient.

(2) Some cases are definitely resistant to treatment with the antimony tartrates and should therefore not be provided for in ordinary rules for treatment.

(3) The maximum total dose of sodium or potassium antimony tartrate that is necessary to effect a cure in any but a definitely resistant case is 4 grammes per 100 lbs. body weight of the patient.

(4) This maximum course of treatment can under certain circumstances be modified; if the writer's rules for dosage have been adopted and provided there has been a decided increase in weight, the spleen is reduced to the level of the costal arch or, in cases where it was very markedly enlarged, by at least 4 inches, and the white blood count is above 6,000 per c.mm., then in cases whose temperature comes to normal by the 7th injection, 30 injections (i.e. 2.55 grammes in an adult) should be given; in cases whose temperature falls to normal before the 10th injection, 35 injections should be given; in cases whose temperature falls to normal before the 16th injection, 40 injections should be given; and those cases whose temperature continues for longer than this should be given a full course of 45 injections or more, bringing the total dose up to 4 grammes per 100 lbs. weight of patient.

(5) The Anglo-Indian appears to be more resistant to treatment than the Indian or even the European. Previous irregular treatment appears to encourage resistance to treatment whereas 'relapsed' cases do not show this resistance. The disease appears to be equally amenable to treatment at all stages.

Acknowledgments.

My thanks are due to Dr. P. Murugesan, my late assistant, and Dr. A. K. Mukerji who did most of the blood counts, to Dr. J. C. Gupta, M. B., the Registrar of the Carmichael Hospital for Tropical Diseases, and to the House Physicians of this hospital who gave most of the injections.

Postscript. 25th July 1924. The writer does not mean to suggest that, when there are facilities for carrying them out, cultural methods for confirming cure should be abandoned; as, despite the failure that he reports, these are probably the most accurate methods to determine cure. When however, one considers that over 35,000 cases of kala-azar were treated in Assam in 1923, and probably a very large number in Bengal, it must be realised that

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TABLE A.

Number.	Sex.	Race.	Age.	Note.	Duration.	Weight lbs.	Salt.	Amount grammes.	Number of injections.	Amount per 100 lbs.	Number f injections to fall of T.	If subsequently irregular.	Amount to fall of temp.	Weight after lbs.	Size of spleen in inches below costal margin.		W. B. C. per c.mm.		Eosinophile per c.mm.		Evidence of cure.
															Before.	After.	Before.	After.	Before.	After.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	M.	H.	20	R.	2	87	K.	3·11	49	3·57	26	..	1·60	+13	8	2¼	2,700	5,000	..	..	S. P.
2	M.	H.	30	..	5	92	K.	2·315	39	2·54	..	..	..	+ 1	6	2½	3,500	10,000	..	1,600	S. P. C.
3	M.	H.	22	..	6	92	K.	2·28	30	2·48	8	..	0·28	+10½	4	P.	..	9,000	..	10,080	C.
10	M.	I. Ch.	7	R.	18	35	Na.	1·56	43	4·46	12	..	0·36	+ 5½	5	P.	5,600	5,000	..	800	S. P. C.
19	M.	H.	35	..	24	102	K.	2·35	30	2·3	A.	..	A.	+18	8	8	4,500	..	180	..	S. P.
20	M.	A. I.	33	..	4	133	K.	2·35	30	1·75	15	..	1·0	+ 5	5	P.	4,400	10,000	262	1,620	C.
21	M.	I. Ch.	11	..	11	58	K.	1·535	29	2·65	A.	..	A	− 3½	3	P.	2,900	6,250	29	250	C.
22	M.	A. I.	26	..	2	102	K.	2·53	33	2·48	15	+	1·0	+ 4¼	3	P.	5,000	4,300	300	86	C.
23	M.	A. I.	15	..	5	65	K.	2·425	40	3·73	18	..	0·95	+23	6	..	2,400	5,300	72	212	C.
24	M.	H.	12	..	12	52	K.	2·275	39	4·38	20	+	1·0	+ 3	4½	1	2,500	6,000	100	270	S. P. C.
25	M.	H.	18	..	9	89	K.	2·385	30	2·67	10	..	0·36	+24	3½	1½	4,500	8,800	135	3,168	S. P. C.
26	M.	H.	10	..	12	43	K.	1·87	30	4·36	3	+	0·05	+ 7½	4½	1	2,500	6,250	50	0	S. P. C.
31	M.	H.	15	R.	24	55	K.	2·12	35	3·85	15	..	0·7	+ 8	5½	2½	3,800	7,500	0	150	S. P. C.
32	M.	A. I.	28	2nd R.	56	95	K.& Na.	2·99	37	3·15	14	..	0·95	+12	9½	5½	1,900	3,750	38	0	S. P. C.
34	M.	H.	11	..	5	54	K.	2·23	37	4·13	14	+	0·65	+ 4	4	P	3,800	6,250	76	750	S. P. C.
36	M.	M.	19	..	6	78	Na.	2·75	33	3·53	6	..	0·21	+12	9	3	2,500	4,500	0	0	S. P. C.
38	F.	A. I.	2½	..	1	20	Na.I.M.	1·1	44	5·5	10	+	0·2	+ 5	3	0	4,200	..	12	0	C.
46	M.	H.	16	..	9	71	Na.	2·82	37	3·97	11	..	0·57	..	9	3½	2,500	4,700	0	..	S. P. C.
50	M.	I. Ch.	10	..	1½	42	Na.	2·38	37	5·67	18	+	1·0	+ 6½	5	0	4,700	..	50	..	L. P. C.
52	M.	H.	16	..	12	104	Na.	3·45	38	3·32	20	+	1·55	+17	9	3	2,500	6,200	50	125	S. P. C.
53	M.	H.	23	..	3	98	Na.	3·47	42	3·54	20	+	1·55	+11½	5	1½	..	6,800	..	272	S. P. C.
60	M.	H.	14	..	2	58	Na.	2·52	30	4·34	15	..	1·05	+22	5½	P.	1,900	5,900	..	0	S. P. C.
61	M.	H.	16	..	5	76	Na.	2·65	30	3·48	13	+	0·85	+ 6	8	4	2,500	6,200	100	0	C.

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62	M.	H.	19	..	13	91	Na.	2·64	30	2·9	A.	..	A	+17	4	P.	2,500	6,200	50	0	C.
64	M.	Eur.	25	..	15	136	Na.	2·94	34	2·16	18	+	1·35	− 6	5	0	3,800	..	100	..	L. P. C.
65	M.	H.	32	..	12	92	K.	2·54	30	2·76	8	+	0·36	+12	5	P.	4,500	8,100	0	1,620	C.
66	M.	H.	22	..	36	91	Na.	2·55	30	2·8	5	+	0·15	+ 3½	7½	2	2,000	5,000	90	1,350	S. P. C.
69	M.	I. Ch.	23	..	12	116	Na.	2·64	30	2·27	16	..	1·15	+ 9	..	0	5,000	7,500	160	0	C.
70	M.	H.	22	..	24	83	Na.	2·64	30	3·18	21	..	1·45	+14	8	P.	5,000	5,600	0	112	C.
71	M.	H.	9	..	11	31	Na.	1·82	30	5·87	22	+	1·26	+ 5¾	5½	P.	1,250	7,500	0	675	S. P. C.
72	M.	M.	22	..	5½	108	Na.	2·6	30	2·4	15	..	1·05	+ 7	6	P.	3,750	7,500	75	150	S. P. C.
73	M.	H.	18	..	8	84	K.	3·16	37	3·74	18	..	1·35	+ 3	6	P.	3,000	12,000	0	0	S. P. C.
75	M.	H.	16	..	24	84	Na.	2·55	30	3·03	14	..	0·95	+10½	6	2	4,650	..	..	..	S. P. C.
77	M.	H.	14	..	3	48	Na.	2·65	37	5·52	12	+	0·75	+10	6	2	2,500	7,500	0	150	S. P. C.
78	F.	H.	17	..	24	82	Na.	2·74	31	3·34	28	+	1·95	+17	5	2	..	..	0	..	S. P. C.
81	F.	Jew	7½	P. I. T.	3	34	Na.	2·37	34	6·97	3	+	0·06	+ 4	1½	P	..	15,000	..	4 500	C.
83	M.	I. Ch.	21	P. I. T.	8	99	Na.	2·5	27	2·52	13	..	0·85	+12	1	0	..	3,500	..	0	C.
84	F.	A. I.	7	P. I. T.	2	44	Na.	2·76	38	6·27	14	..	0·8	− 2	5	2	4,500	9,400	180	188	S. P. C.
88	M.	H.	19	P. I. T.	7	58	Na.	4·0	44	6·9	36	..	3·15	+16¼	3	P.	3,100	6,500	62	520	S. P. C.
89	M.	H.	10	..	7	40	Na.	2·68	37	6·7	7	+	0·28	+ 7	6	P.	2,800	18,000	0	720	S. P. C.
92	M.	I. Ch.	7	..	1	40	I. M. Na. I.V.	1·3 2·0	35 32	8·35	F.	..	3·3	+ 4	3	P.	5,000	12,500	200	1,875	S. P. C.
93	M.	H.	18	..	20	56	Na.	4·0	45	7·14	30	+	2·5	+ 9	6	2	2,000	6,900	80	414	S. P.
94	F.	H.	25	..	7	59	Na.	4·2	47	7·11	30	+	2·5	+10	6	P.	3,100	14,000	0	1,120	S. P. C.
95	M.	H.	23	..	8	77	Na.	3·14	35	3·42	9	..	0·45	+20	3	P.	5,600	8,800	224	1,320	S. P. C.
98	M.	H.	30	..	9	105	Na.	2·84	32	2·7	19	..	1·45	+ 1	6	3	2,500	7,000	0	350	S. P. C.
102	M.	H.	33	..	10	94	Na.	2·44	28	2·59	20	..	1·55	+14	2	1½	4,400	7,500	0	825	S. P. C.
103	F.	H.	35	P. I. T.	72	102	Na.	4·3	47	4·21	47	..	4·3	+ 7½	4	2	2,500	4,000	0	0	S. P. C.
104	F.	A. I.	17	..	24	65	Na. K.	2·87	34	4·41	7	..	0·28	+16	6	P.	2,000	..	0	..	S. P. C.
107	M.	A. I.	15	..	2	84	Na.	2·64	30	3·14	5	..	0·15	+12	4	0	..	..	..	..	S. P. C.
111	M.	H.	10	..	8	40	Na.	2·72	40	6·8	25	..	1·7	+ 2	6	P.	2,500	11,000	100	550	S. P. C.
115	F.	A. I.	20	..	6	97	Na. K.	2·25	31	2·31	13	..	0·85	+ 7	6	0	3,100	10,000	0	0	C.
118	M.	H.	28	..	2	74	Na.	2·84	32	3·84	?	..	?	+16	4½	P.	2,200	7,500	0	300	S. P. C.
119	M.	H.	20	..	6	87	Na.	3·64	52	4·18	6	..	0·21	+ 5½	9	5	5,600	7,500	0	150	S. P. C.

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TABLE A.—(*Continued*).

Number.	Sex.	Race.	Age.	Note.	Duration.	Weight lbs.	Salt.	Amount grammes.	Number of injections.	Amount per 100 lbs.	Number of injections to fall of T.	If subsequently irregular.	Amount to fall of temp.	Weight after lbs.	Size of spleen in inches below costal margin.		W. B. C. per c.mm.		Eosinophile per c.mm.		Evidence of cure.
															Before.	After.	Before.	After.	Before.	After.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
120	M.	H.	22	..	7	89	Na.	3·0	35	3·37	7	+	0·28	+15	6	P.	5,000	11,800	150	714	S. P. C.
121	M.	I. Ch.	8	P. I. T.	4	38	Na.	3·3	51	8·68	F	..	3·3	+ 7	4	P.	7,300	8,800	292	264	S. P.
124	F.	H.	14	..	6	66	Na.	3·76	40	5·67	16	..	1·25	+ 9	8	2	..	8,800	..	528	S. P. C.
125	M.	H.	40	R.	17	117	Na.	3·63	40	3·1	A.	..	..	+32½	8	2	..	6,200	..	0	C.
126	F.	A. I.	45	..	10	114	Na.	2·9	36	2·54	17	..	1·25	+ 6	4	2	..	6,200	..	248	S. P. C.
127	M.	H.	25	..	21	113	Na.	3·64	40	3·22	9	..	0·45	+16	11	4	2,500	6,500	50	260	S. P. C.
128	M.	H.	10	..	6	57	Na.	2·67	36	4·71	7	..	0·28	+ 5	7	P.	5,600	8,000	56	0	S. P. C.
129	F.	I. Ch.	15	..	6	63	Na.	3·04	35	4·82	14	..	0·95	+12	4½	0	..	7,500	..	0	C.
131	M.	H.	24	..	4	80	Na.	3·55	40	4·43	11	..	0·65	+12	6½	1	1,250	7,500	12	600	S. P. C.
136	F.	A. I.	9	..	4	49	Na.	2·67	35	5·44	9	..	0·76	+ 6	1½	0	..	8,500	..	170	C.
138	F.	A. I.	42	..	6	82	Na.	4·14	40	5·04	30	..	2·65	+ 5	5	0	3,200	10,000	0	400	C.
140	M.	M.	9	..	8	39	K. Na	2·21	35	5·7	5	..	0·15	+ 6	5½	2	..	7,500	..	600	S. P. C.
142	M.	H.	14	..	4	62	K. Na.	3·32	40	5·35	12	+	0·75	+10½	5	P.	4,200	10,000	0	500	S. P. C.
144	F.	A. I.	48	..	3	213	Na.	3·2	36	1·5	10	+	0·55	— 8	5	P.	..	6,200	..	124	C.
145	F.	A. I.	17	..	9	77	K. Na.	3·1	35	4·02	9	..	0·45	+13	7	P.	2,000	5,600	20	336	S. P.
146	M.	H.	39	..	4	91	Na.	3·64	40	4	14	..	0·95	+ 6½	P.	0	6,200	8,000	0	160	C.
157	M.	H.	26	..	6	80	Na.	2·04	25	2·55	5	+	0·12	+12	P.	0	..	..	..	..	C.
132	M.	H.	17	..	5	88	(Na.)	(1·25)	..	..	..	..	..	+12	6	3	3,100	7,600	0	375	S. P. C.
147	M.	H.	14	..	12	63	(Na.)	(0·5)	..	..	..	..	..	+ 9¼	5½	2	3,800	5,000	228	0	S. P. C.
139	M.	H.	12	..	10	42	(Na.)	(0·5)	..	..	..	..	..	+11	3	P.	3,100	7,500	31	150	S. P. C.
149	M.	M.	35	..	24	71	(Na.)	(1·0)	..	..	..	..	..	+ 7	5½	2	..	4,500	..	90	S. P. C.
150	M.	H.	12	..	8	73	(Na.)	(1·12)	..	..	..	..	..	+20½	5	2	..	5,000	..	100	S. P. C.

NOTE.—The last five cases received injections of a modified solution of sodium antimony tartrate from which some of the antimony had been precipitated by the addition of alkali.

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TABLE B.

85	M.	A. I.	38	P. I. T.	8	108	Na.	5·21	57	4·82	44	+	3·91	+ 9	6	4	2,500	7,500	200	150	S. P. C.
87	M.	Eur.	37	P. I. T.	3½	121	Na.	3·64	40	3·08	38	+	3·44	− 2	6½	P.	2,500	5,000	0	150	S. P.
108	M.	A. I.	17	R.	2	115	Na.	5·3	65	4·6	56	+	4·4	+ 2¾	6½	5½	..	3,000	..	240	S. P. C.
116	F.	A. I.	17	P. I. T.	6	77	Na.& K.	2·98	50	3·87	..	..	..	− 1	5	3	..	4,000	..	0	S. P
143	M.	A. I.	32	..	1′	88	Na.& K.	4·05	45	4·6	19	+	1·45	+13	6	P.	..	6,000	..	0	C.

TABLE C.

33	M.	A. I.	30	..	10	84	Na.& K.	1·0	17	1·19	2	+	..	+19	6	1	1,800	3,400	36	68	..
35	M.	H.	12	..	6	74	Na.	1·05	15	1·41	A.	..	..	+ 2	2½	P.	3,100	..	0	..	..
40	M.	H.	22	..	3	114	Na.	0·27	6	0·23	6	..	..	..	5½	5	3,100	..	0	..	..
51	M.	H.	10	..	..	45	Na.	0·63	12	1·4	F.	..	..	..	P.	?	..	..	..	..	..
86	F.	I. Ch.	11	..	⅓	50	0	0	0	0	..	..	..	..	P.	P.	..	..	..	..	..
113	M.	H.	22	..	12	81	Na. K.	1·35	24	1·7	12	..	..	..	3	1½	..	9,700	..	194	..

TABLE D.

7	M.	H.	22	..	4	91	K.	1·55	..	1·7	10	..	..	+ 5½	5	4½	3,500	..	0	..	..
12	M.	H.	22	P. I. T.	10	81	K.	1·56	..	1·92	F.	..	..	+ 8	7	5½	..	2,000	..	60	..
13	M.	H.	42	..	⅔	90	Na.	0·06	..	0·07	F.	..	..	..	3	3	4,800	5,000	96	100	..
18	M.	H.	33	..	3	100	..	0	..	0	F.	..	..	..	8	8	2,500	..	50	..	..
37	M.	A. I.	23	P. I. T.	12	106	Na.	0·24	..	0·22	F.	..	..	..	6½	6½	4,500	..	90	..	..
43	M.	H.	38	P. I. T.	9	115	Na.	2·3	29	2·0	13	+	..	+ 8	5	2½	..	..	..	..	..
137	M.	A. I.	51	..	..	110	..	0	..	0	F.	..	..	..	P.	2	..	..	..	..	..
96	F.	A. I.	13	P. I. T.	..	80	Na.	5·05	64	6·31	F.	..	..	..	7	9	..	..	..	..	..
108	M.	A. I.	17	..	2	115	Na.	2·86	38	2·48	31	+	..	+ 1½	6½	5½	..	..	..	..	..
15	M.	M.	40	..	6	89	..	0	..	0	F.	..	..	..	6	6	3,200	..	0	..	..

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the troublesome cultural methods—methods which, further, demand considerable technical skill and experience—of confirming cure, are quite out of the question in more than 99 per cent. of cases.

L. E. N.

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Abbreviations used in the Tables.

Column.

3. Race or religion:—H.—Hindu. M.—Mohammedan. A. I.—Anglo-Indian. I. Ch.—Indian Christian. Eur.—European.
5. Note:—R.—a case that has previously had a complete course of treatment but has relapsed. P. I. T.—a case that has had previous irregular treatment, not amounting to a proper course of treatment and not in any way improving the patient's condition.
6. Duration of the disease previous to coming under treatment expressed in months.
8. Salt of antimony tartrate used:—K.—Potassium ant. tart. Na.—Sodium ant. tart. K. Na.—Sodium potassium ant. tart. K. and Na.—both salts were used but at different times. I.M.—intramuscular injections. I. V.—intravenous.
9. Total amount of the salt that was given, in grammes.
10. Total amount given relative to the body weight of the patient expressed in grammes per 100 lbs. weight of patient.
12. Number of injections before the fall of temperature to normal:—A.—Afebrile throughout. F.—Febrile throughout.
13. Whether subsequently slightly irregular or not. + = irregular.
14. Total amount of salt that was given before the temp. fell.
16 & 17. Size of spleen:—P.—palpable on inspiration. O.—not palpable.
22. Evidence of cure at the time of discharge:—S. P. C.—Spleen puncture and culture. S. P.—Spleen puncture but no satisfactory culture. C.—on clinical grounds only. L. P. C.—Liver puncture culture.

SAPONIFICATION OF BODIES IN THE UNITED PROVINCES OF AGRA AND OUDH.

Being a paper read at the Medical Research Section of the Indian Science Congress, 1924.

By RAI BAHADUR JAISING P. MODI,

Reader in Medical Jurisprudence, Lucknow University, and Medico-Legal Officer, Lucknow District,

and

D. N. CHATTERJI, B.A., B.SC., A.I.C.,

Chemical Examiner for the United Provinces and Central Provinces, Agra.

IN the February issue of the *Indian Medical Gazette*, 1889, S. Coull Mackenzie, Police Surgeon of Calcutta, published an account of eight cases of saponification observed by him during his nine years of medico-legal work in that city. In the April issue of the same journal for 1897 Dr. George H. F. Nutall published a paper under the title "Has adipocere been observed in India?" in which he pointed out that the process of saponification in India had not yet been proved and that Mackenzie had possibly mistaken the effects of putrefaction and maceration for adipocere formation, inasmuch as according to Hoffman's observations "muscular tissue which has macerated and putrefied in water presents an appearance sufficiently similar to adipocere to deceive the unpracticed eye."

In the next issue of the *Indian Medical Gazette*, Surgeon Captain D. M. Moir challenged Dr. Nuttall's arguments and protested against the way in which he summarily dismissed the observations of such a careful and accurate observer as Coull Mackenzie, who had a most extensive experience in morbid anatomy of the human body. Moir also described the case of a body which had undergone saponification after a burial of three weeks on the banks of a tank in the Chittagong District.

There is ample evidence that the process of saponification of bodies takes place in the United Provinces of Agra and Oudh, when they are submerged in water or buried in damp soils. This change commonly occurs after a certain degree of putrefaction has already taken place. But, as no cases have so far been reported, the opportunity is here taken of describing a few of the cases which have come under the personal observation of the senior author in his capacity as Medico-legal Officer of Agra and Lucknow districts during a period extending over seventeen years. It may be mentioned that only two cases of saponification were observed in Agra during a period of eleven years; whereas ten cases came to his notice in the district of Lucknow during the last five years. This is probably due to the climatic variations between two districts.

Case 1.—A Mahomedan woman, Must. Rahiman, aged 20 years, of Police Station Mandiaon, committed suicide by jumping into a well on the 28th September, 1919, and was buried in a *kutcha* grave. Her father petitioned the District Magistrate to the effect that his daughter had been murdered. The body was therefore exhumed and examined at 12 noon, on the 9th October, 1919. The eye-balls were disorganised and the face was flattened. Some of the hair on the head had became loose and had fallen off. The soft tissues of the body externally had been saponified, as also the heart and stomach. In this case saponification was visible on the twelfth day after the death.

Case 2.—The body of Budhu, aged 30 years, son of Lallu Kachi, of Police Station Banthra, was removed from a well on the 30th January, 1920, seven days after the deceased had disappeared from his house. The following day a post-mortem examination was held, when the face muscles and soft tissues were found saponified. The abdomen was distended and the internal organs were decomposed.

Case 3.—The body of Autar, son of Badal Passi, of Haiyat Nagar, Police Station Goshainganj, was

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recovered on the 6th April, 1920, from a *nala* full of water with the hands and feet tied to the neck, with a rope and stones attached to the body to make it sink. At the post-mortem examination, held on the 7th April, the seventh day after his disappearance, the body was found in a decomposed condition, but saponification was commencing in the buttocks, scrotum, shoulders and wrists.

Case 4.—Musamat Maha Rania, wife of Mukha Ahir of village Sikandarpur Nazool, Police Station Banthra, had been missing for about a month. On the 30th December, 1921, chowkidar Chootai of that village discovered a dead body floating in a well. The body on being taken out was identified to be that of Musamat Maha Rania, who was presumed to have committed suicide on account of having been involved in a burglary case. The body was that of a woman, 50 years old. The soft tissues of the face and skull bones had been loosened but the abdominal and thoracic walls were saponified. Internally, the omentum was saponified, as also the heart muscle.

Case 5.—On the 26th February, 1922, a report was made at Police Station Malihabad that Ramadhn, Brahman, 55 years old, of Ramgarh, was missing. On the 2nd April the body of the deceased was found in a well of village Hamirpur. A post-mortem examination was held on the body on the following day. The body was well preserved. There was no disagreeable smell. The eyeballs had disintegrated and the teeth had loosened. The features were, however, well preserved. Saponification had taken place in the soft tissues of the trunk, scrotum, penis and extremities. There was an incised wound four inches by two inches across the right side of the neck, cutting the windpipe and separating the fourth cervical vertebra from the fifth. The edges of the wound were very well preserved and were found to be even and regular. The brain was liquified. The spinal cord was too softened to be removed in the area of the wound. The lungs were reduced to a small mass. But the abdominal fat and mesentery were saponified; the liver had also undergone saponification.

Case 6.—The body of Musamat Jasoda, a girl four years of age, was taken out of a well on the 26th March, 1923. On examination externally the buttocks were found saponified and internally the mesentery and omentum. The girl was robbed of her silver ornaments and had been thrown into the well about ten days before.

Pathological Examination.—In the last two of the above mentioned cases, pieces of saponified tissues, viz., muscle, mesentery, omentum and liver were sent to the Pathological Department of the King George V Medical College for section cutting and examination. Dr. J. G. Mukherji sent the following report:—

"Macroscopically, the tissues appeared to be yellowish-white, disintegrated masses. Under the microscope no definite structure was seen. Masses of acicular crystals and round bodies about three times the diameter of a red cell were detected. On treatment with xylol most of the above were dissolved, leaving a hazy round outline. In all probability the crystals and the round bodies consisted of neutral fat and soap."

Chemical Analysis.—The following results of analysis were obtained in the laboratory of the junior author, Chemical Examiner for the United Provinces and Central Provinces, at Agra:—

Case No. 5.—Pieces of saponified muscle, mesentery, fat and liver were removed from the body and placed in a bottle with rectified spirit. These were forwarded for chemical analysis. The fatty substance was completely dissolved in the alcohol.

The total amount of fatty substance recovered from the alcohol at the time of analysis in November, i.e., about seven months after the post-mortem examination, was 63 grammes. It was practically soluble in ether, and contained only traces of mineral matter. The other tissues on analysis were found to contain

Ash ..	.. 5.6 per cent.
Ethereal extract	.. 53.4 per cent.

The quantity of unsaponified matter in the fatty substance recovered from the preservative spirit and the other tissues was two per cent.

Soap was present, but in very minute quantity; this soap was probably a lime soap. Most of the adipocere consisted of free fatty acids, viz., stearic and palmitic acids. No ammonia was present. The ash from the tissues contained lime, soda and potash compounds.

Case No. 6.—Pieces of saponified buttock and mesentery were sent for chemical analysis preserved in rectified spirit. The following are the results of analysis made in July 1923:—

The total amount of fatty matter which was dissolved in the alcohol was 23.4 per cent. It contained only 0.2 per cent. of mineral matter and 0.5 per cent. of unsaponifiable matter. The results of the analyses of the tissue are:—

	Ash.	Ethereal Extract %.	Unsaponifiable matter %.
Buttock ..	0·4	73·5	23·1
Mesentery ..	0·7	80·0	48·7

No soap was found. The fatty matter obtained from the preservative spirit consisted of free fatty acids, viz., stearic and palmitic acids. No ammonia could be found. The ash from the tissues sent contained lime, soda and potash compounds.

The above results go to support the following remarks regarding adipocere given in his *Forensic Chemistry* by A. Lucas (p. 233):—

"From these analyses it is evident that adipocere is composed entirely of fatty acids, but that it contains a certain amount of calcium soap, and, probably, in the early stage of its formation some ammonia soap, and therefore from its chemical composition there can be little doubt that adipocere is the residue of the fat pre-existing in the body, the greater part of which has undergone slow hydrolysis by water, but some small part of it has been saponified by ammonia (derived from decomposing nitrogenous tissue), this ammonia being ultimately replaced by lime."

It is suggested that more work should be done on this subject as cases of saponification come to

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hand, with a view to arrive at a definite conclusion regarding the constitution of adipocere.

SUMMARY.

Of twelve cases of saponification which came under the personal observation of J. P. Modi, six cases are described in this paper. The time required for saponification in these cases varied from seven to thirty-five days. It is pointed out that saponification is more common in Lucknow than in Agra, probably owing to some climatic variation. The saponified tissues in the last two cases of the series did not show any definite structure under the microscope, except masses of acicular crystals and round bodies consisting, in all probability, of neutral fat and soap. Chemically these substances consisted of a minute quantity of lime, soap, free fatty acids, viz., palmitic and stearic acids, unsaponifiable matter and the ash containing lime, soda and potash compounds.

TYPHUS FEVER IN THE AGENCY TRACTS, MADRAS PRESIDENCY.

By J. CUNNINGHAM, M.D.,
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Director, King Institute of Preventive Medicine, Guindy, Madras,
and
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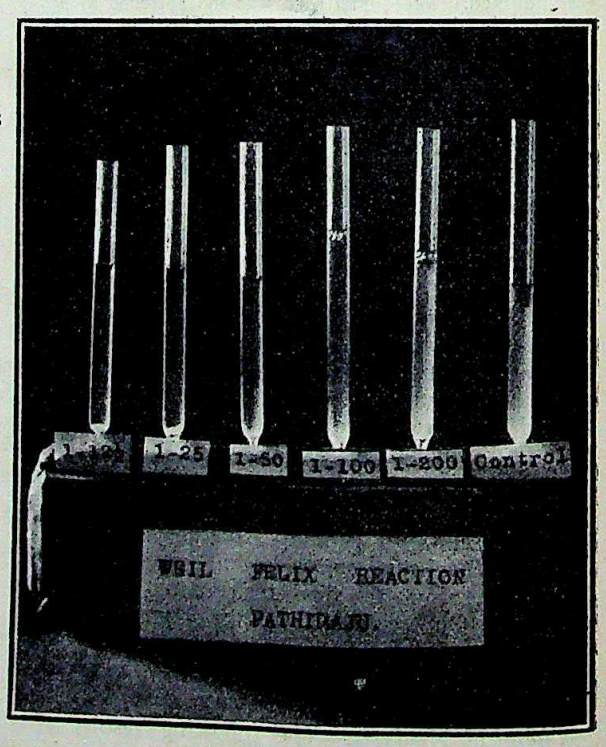
THE distribution of typhus fever in India is so imperfectly known that the occurrence of cases in localities where the disease has not yet been previously recognised is worthy of record. Between the beginning of February and end of March this year, 8 specimens of blood were received at the King Institute from the Medical Officer in charge of the Base Hospital, Narasapatnam; the base for the Fituri operations which have up till recently been carried on in the Agency Tracts of this Presidency. All of these specimens were negative to the usual examinations for malaria and fevers of the enteric group. The eighth case, however, gave a well marked Weil-Felix reaction, being positive in 1-100. This case was thus proved to be one of typhus fever. As no cases of this type of fever have, so far as we are aware, been previously reported in this Presidency, we requested Dr. Kesawaswamy to give us further information as to this particular case. His description of the symptoms together with the temperature chart, which he kindly forwarded to us, are typical and leave no doubt as to the correctness of the diagnosis. He also gives the following additional notes on the outbreak which are of interest.

"Before the Assam Rifles came to this Agency about the end of January 1924, this type of spotted fever was unknown in the Agency. Eight cases with exactly similar clinical pictures were admitted to this Hospital between 12-2-24 and 29-2-24. The first case was that of a sub-assistant surgeon attached to the Assam Rifles. Of the 9 cases (including the one under report) 5 were among the Assam Rifles, 2 among sub-assistant surgeons attached to the Assam Rifles, one (the present case) is an orderly attached to a sub-assistant surgeon (who was not attacked). In all cases the rash disappeared about the 25th day. Convalescence was established between the 15th and 18th day of the illness."

The disease was therefore obviously imported by the Assam Rifles from Assam. There is no information as to whether the disease has spread to the civilian population, but no cases have been reported from this source up to the present. It is of interest to note in this connection that the Agency Tracts where these cases have occurred have been free from relapsing fever, so far as we are aware; whereas in the Nilgiri Hills, where relapsing fever is raging at present, no evidence of typhus fever has been obtained, although we have examined the sera of many cases of fever in whose blood no spirochætes could be found at the time of examination.



The enclosed photograph shows the positive Weil-Felix reaction in case 8.

It would appear that even in hill tracts in this country relapsing fever and typhus fever do *not* occur in association with each other.

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Indian Medical Gazette.

OCTOBER.

OF FASHIONS IN MEDICINE.

"WHEN physicians are at a loss to know what to do," wrote Pliny the elder some nineteen centuries ago, "some of their patients they send to vows and miracles, others to hot baths and waters"; "and"—adds Montaigne, writing as a patient suffering from the agonies of renal colic some fifteen centuries later, "their last device is to send us to the better air of some far country." A survey of present-day fashions in medicine assures us that what was true in Pliny's day, as also in Montaigne's, is true to-day. An ancient Egyptian rock-carving dated B. C. 1460 represents the accouchement of Queen Tyi in giving birth to the celebrated princess Baktaten, the wife of Tutankhamen. The patient is shewn seated upon the quaint and huge obstetric chair of those ancient days, whilst the nurse, from below the chair, assists in the delivery. The position of the patient and her relationship to the effects of gravity upon an infant some 7 to 8 lbs. in weight are those most suited to the circumstances of the case; to-day, however, we discuss whether the left lateral or the dorsal decubitus, both supposed to be worked out upon a physical and physiological basis, is the more helpful.

One of the best known medical pictures is that by Luke Fildes, depicting a grave and bearded physician seated with his stethoscope, and more or less helpless, beside the bedside of a child suffering from broncho-pneumonia, determined to pull the case through, although he clearly has not the vaguest notion of how to set about it. To-day the modern equivalent would probably be the picture of a clean shaven and youthful practitioner with a hypodermic syringe in one hand and an ampoule in the other. The treatment of a case of typhoid fever can only be symptomatic, yet we have been assured that enormous doses of astringents together with repeated sponging if the temperature is above 102.5°F. for a typhoid case, will see the patient through; and this despite the fact that probably some of such cases are early cases of kala-azar, with a natural tendency to periods of apyrexia; whilst others would yield a Widal reaction positive to one of the paratyphoid organisms, and the paratyphoid fevers have a marked tendency towards spontaneous cure, no matter what the treatment.

The greatest friend of the average medical practitioner is undoubtedly Nature, since the majority of cases of disease tend towards natural and spontaneous cure. But if any particular drug happens to have been administered, the credit for the recovery is not ascribed to Nature but to the drug and to the practitioner concerned.

So, if we turn to a survey of present-day fashions in medicine, we may place first the tendency to prescribe extracts of endocrine glands. This is a particularly fruitful field; in fact, we understand that the recent publication of a paper advocating the treatment of sprue by administration of parathyroid extract led to almost immediate exhaustion of all the supplies of parathyroid extract available locally in India. A second favourite prescription is sandwiches of fresh pancreas; in case any plutocrat in Calcutta is carrying a tin of such sandwiches around with him for refreshment between meals, we can assure him that the ordinary Indian butcher does not know what or where the pancreas is, and that he usually substitutes testis. Insulin, once a specific for pancreatic diabetes, is now used for diseases ranging from asthma to sprue. A few years ago it was popularly maintained that every colon should be excised, since the possession of a "cesspool" can obviously benefit nobody. To-day liquid paraffin and "intestinal antiseptics" take the place of the more radical treatment, and a correspondent to a recent issue of a medical journal suggests that, in view of the universal demand for liquid paraffin as an intestinal lubricant, the British Empire would do well to secure in perpetuity the lease of the Persian oil fields. With regard to "intestinal antiseptics," the claims made are so great that they often tend to destroy what would otherwise be a good case. We visualise a single tablet of some such "antiseptic" commencing its long journey through 32 feet of gut, mostly swarming with bacteria, but with the noble intention of destroying every bacillus encountered on the way. Even then, unfortunately, we do not know whether it is better for man to have a cesspool or a sterile intestinal tract; in the former event he will presumably suffer from intestinal toxæmia, in the latter apparently from loss of essential metabolic products. In fact, in the matter of his intestinal tract, Nature appears to have let man down very badly.

"Colloid" preparations are another recent medicinal fashion. In this matter we all stand more or less on the same level of ignorance, since, to tell the plain, unvarnished truth, no one really knows what a colloid substance is, and only some of the "colloid" preparations on the market are in a truly colloidal state, the others being mere suspensions. Synthetic drugs constitute another very prevalent feature of our present-day practice. If arsenic, for example, can be administered

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hypodermically as, let us say, para-amino-phenyl-di-hydroxy-arsenate of sodium and potassium (combined) hypodermically, it will obviously impress the patient far more than will the simple oral administration of Fowler's solution. Further, if such a synthetic drug is of value in one disease, it must obviously be tried for every other; thus, as Bayer 205 is a very efficacious remedy for trypanosomiasis, it must obviously be tried for kala-azar, although the parasites of trypanosomiasis and of kala-azar are as different as is a monkey from a guinea-pig; and since von Heydon 471 is a remedy of very great value in the treatment of kala-azar, a protozoal disease, it should at once be tried in filariasis, a helminthic disease, where "it will probably do good."

With regard to foods, individual fashions vary still more. Thus we are assured that vitamines are essential; although opinions vary as to what foods contain them, and in what proportions; whether the domestic onion, for example, is rich in their supply or grievously deficient in their nutritive properties appears to vary with the observer concerned. Goat's milk is an increasingly popular remedy, we are informed, for delicate and ailing children, and we soon expect to see the motto of "one sick child, one goat" rigidly enforced. We have even been informed that it would probably be better, in fact, if the goat is brought into the children's ward in hospital and tethered to the bed of the child concerned, since, if the goat be not milked in the immediate vicinity of the patient, the precious and mysterious vitamines may be lost in the course of transit from goat to child. And, as the ordinary "travelling sahib" is escorted around India by his bearer, carrying the inevitable empty kerosine oil tin for "master's bath," we may soon expect to see the sick child travelling around India in search of different specialists, but constantly escorted by his (or her) faithful goat.

Methods of administration of drugs again afford a fruitful field for the exercise of originality, and it is obviously to the benefit of the practitioner, or as we may term him the "medicator" if not to that of the patient, if all drugs, from simple iron to complex bacterial vaccines, be administered by hypodermic injection; it means more fees, more profitable employment of otherwise idle hours, more kudos in a word. As regards even so simple a matter as posture in bed, there are opportunities for the exercise of originality; thus if a patient supposed to be suffering from visceroptosis be tied up by the heels for six weeks on end in an almost inverted position, the results are bound to impress someone, and most likely the patient.

We may say, in brief, that every physician of to-day is a born experimentor, although most unfortunately he has not often acquired the knowledge of how to carry out his experiments properly. Still, the desire for knowledge being what it is, it is unlikely that physicians will ever cease from experimenting with patients. Since the days of Pliny the elder, this rule has apparently held, and after all the acquisition of knowledge is worth a lot, especially as the patient is the one who pays.

* * * * *

One of the recent fashions in medicine being the occult and mystic practice of psycho-analysis, we may now proceed to "psycho-analyse" this situation on the *lucus a non lucendo* principle.

The experienced psycho-analyst will, of course, make immediately for the centre of things, and will at once recognise in the hypodermic syringe, which is almost the central emblem of most present-day medicinal cults, a suitable phallic emblem. If we add to this the hypodermic needle, and the pleasure of inflicting pain with it, as for example by intramuscular injections of quinine, a sadistic concept at once becomes obvious. Anal erotism becomes apparent in the almost absurd idea of trying to completely clean out the whole alimentary tract, as for instance by the administration of immense doses of liquid paraffin in intestinal tuberculosis. A very good example of repressed complexes occurs in a pamphlet which we have recently received on the proper method of treating snake-bite. The author first explains that the use of alcohol in this condition is very dangerous; what he advocates instead is the administration of "ethyl hydroxide" (the same chemical compound). The author explains that by inhaling ethyl hydroxide this "remedy" becomes converted in the body into aldehydes, formates and other antiseptics, and in some repressed way apparently benefits the original condition of snake-bite of the distal tissues. We desire ardently to follow this clue further, but unfortunately considerations of space forbid.

And, inasmuch as both lightning and the mistletoe have been almost universally recognised as representing the semen of Jove, it is obvious that colloidal therapy may represent a similar idea; in fact, as a recent and authoritative work on psycho-analysis informs us, "the patient can merely choose his symbols to form new ones, and even in the latter case, they have the same meaning as they would have with other people who might use them. This curious independence of symbolic meanings raises in another form the old question of the inheritance of ideas..... Symbolism has to be recreated afresh out of individual material, and stereotypy is due to the uniformity of the human mind in regard to the particular tendencies that furnish the

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sources of symbolism." If this particular sentence means anything—which we doubt—the true place of the colloids in modern therapy will be apparent.

Sublimation, which is defined as "the deflection of the energy of a sexual impulse to a non-sexual and socially useful goal," is apparent on all sides. Thus the more difficult is a given drug to obtain, the more frequently is it prescribed. Thus we note that leaves of some herbs are of no value in malaria unless collected during the monsoon, the *kabirajs* will have nothing to do with extracts which are not prepared from fresh plants, and goat's milk is much harder to obtain than is cow's, especially in Calcutta since the recent rise in the price of goats. Secondly, the more expensive a drug is, obviously the more effective it must be. This "principle" is at least honestly recognised in Ayurvedic medicine, where there are drugs for princes and noblemen which contain that wonderful metal gold, and carbon in the form of precious stones; and quite another class of drugs for the common people who cannot afford such luxuries. In consequence of this idea, patients may be compelled to travel far afield before they find the real "philosopher's stone."

Homosexuality is a further element in the now confused picture; as instanced by the administration of the secretions of the gonads. We understand indeed that an adult male chimpanzee was imported into Calcutta last year, and that his two "glands" were distributed at operation between two elderly male Marwaris. What was the subsequent fate of the chimpanzee, or of the two Marwaris, and whether the latter subsequently cornered the jute market or took to climbing trees, we regret that we do not know. But no experienced psycho-analyst will have any difficulty in tracing the confused homosexual element in our present picture; "the libido theory has been carried much further than at first seemed possible," to quote our previous author, "indeed Freud sets such hopes on the results to be achieved by future researches in this direction that he anticipates that they will make our present psycho-analytic knowledge seem small in comparison." Enough said.

We have still got to fit in the "Oedipus complex" somewhere, or we are no true psycho-analysts. It probably fits in best with the bottle; with the idea that what will cure the patient is not a study of the symptoms, but something in a bottle. Here the obsession concerned is universal. Admittedly the possession of the bottle is a poor substitute for possession of the mother, but here there are probably one or two repression-complexes to be considered. Unfortunately we cannot follow them further.

Mysticism, although not recognised by modern psycho-therapy (who would recognise that what is inexplicable is beyond our comprehension?)—also comes in. Its influence is evident in a thousand directions; in the attempts to disguise the old-fashioned cod-liver oil by a new nomenclature, in the presentation of common chalk in the unique form of desiccated cuttle-fish bones as a certain cure for sprue, in the substitution of countless "synthetic" derivatives for a few inorganic salts of equal or greater efficacy. But that mysticism is and always has been a potent force in medicine is a commonplace. "It is probable," writes Montaigne, "that the chief credit of miracles, of visions and spells and such abnormal effects, hath its source in the power of the imagination, acting principally upon the minds of the vulgar."

Finally, we may recognise an element, as yet not completely understood by the psycho-analysts themselves, of incurable optimism. Thus a patient suffering from asthma may be treated for years on end with different remedies without effect, and may yet imagine all the time that she is getting better; whilst the effect of infinitesimal doses of tuberculin on cases of phthisis may be but to increase the curious optimism from which patients from this disease suffer. There are doctors who see good in everything; veritable godsends to the druggist and pharmacist. Thus one drug does good in a given disease, another does better, a third is promising, of a fourth we have great hopes, a fifth we have seen to have good results, a sixth to do good in some cases; in brief, is there here *any* drug which is without benefit at all?

There are two methods of dealing with human diseases. One constitutes the science, art and practice of medicine, the attempt to ascertain accurately from what disease or combination of diseases the patient is suffering; the other to prescribe for him such remedies as we hope will alleviate his more obvious symptoms.

The first constitutes the practice of medicine; the second, we may say, constitutes the very far different practice of "medication." And "medication" is a practice—we cannot term it an art or science—very different from that of medicine. Its chief ingredients are faith on the part of the patient, hope on the part of everybody concerned, and—not charity—but ignorance on the part of the prescriber. And we regret to state that medication, as distinguished from the practice of medicine, will continue to flourish in India, as in every other country of the present-day "civilised" world until the quack and the "medicator," as distinguished from the true physician, are placed under due control and surveillance.

We began with Montaigne, and we may as well finish with him. In that far off sixteenth century he records that the prevalent articles

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of the then pharmacopœia were the left foot of a tortoise, the urine of an elephant—(to-day we understand that the urines of the rhinoceroses at the Calcutta Zoo fetch a high price)—the liver of a mole, and the excrement of rats beaten to a fine powder; a prescription which was apparently the forerunner of the polyglandular therapy of to-day. "A physician takes no pleasure in the health even of his friends," he writes, "and after the cure is performed, how can he assure himself that it was not because the disease was arrived at its period, or an effect of chance? Or the operation of something else that he had eaten, drunk or sucked? Or by virtue of his grandmother's prayers?" And yet, when he was sick he sent for the physicians, little though he expected of them. They do their best, he explains in his immortal essays, and they include many good fellows of the nobler sort.

INDIAN SCIENCE CONGRESS, 1925.

The Indian Science Congress is to be held at Benares in January, 1925. Medical workers in India are invited to send papers for the Medical Research Section to Lieutenant-Colonel F. P. Mackie, O.B.E., M.D., F.R.C.P., F.R.C.P.S., I.M.S., President Elect of the Medical Research Section, Bombay Bacteriological Laboratory, Parel, Bombay. Papers should be of such a length that they will not exceed ten minutes in the reading, and they should, if possible, be the results of research, or be of such a nature as to stimulate discussion on the scientific aspect of some medical problem. This means that purely clinical articles are not suitable.

Abstracts and preferably the complete paper should reach Colonel Mackie by November the 30th at latest,—otherwise the printing of such abstracts and papers may be impossible.

A Mirror of Hospital Practice.

MARRIS' ATROPINE TEST IN TYPHOID FEVER AND ITS VALUE.

By Dr. A. BAYLEY DE CASTRO,

Junior Medical Officer, Haddo, Port Blair.

THE discovery of the atropine test as a diagnostic adjunct in cases of typhoid fever is undoubtedly a boon, especially to the practitioner in the *mofussil*, where the facilities for a Widal reaction and for other serological and microscopical tests are not available.

The following account of the test is given on p. 86 of the 12th (1922) edition of Taylor's "Practice of Medicine":—

The pulse rate is taken and recorded minute by minute till it is steady. One thirty-third of a grain of atropine sulphate is then injected subcutaneously, best over the triceps. After twenty-five minutes the pulse is again recorded minute by minute till it is clear that it has reached its highest point, and is now falling. Marris concludes that an increase of the pulse rate by twenty or more beats in the minute after atropine, may be accepted as an indication that the patient is probably *not* suffering from typhoid fever or one of the paratyphoid series. An increase of less than ten beats is suggestive of infection by one of these diseases. Readings between ten and twenty are uncertain.

I have now been using this means of diagnosis in conjunction with other clinical manifestations in dozens of cases and have never found it wanting.

Independently of my carrying out this test in the ward, a laboratory test of some kind was performed at head-quarters on Ross Island, which only confirmed the diagnosis, and the value of this simple atropine test.

A synopsis of a few cases may be of interest and these I briefly append below:—

Case No. 1.—March 1924. Female aged 28. Vomiting, purging, severe vertigo, enlarged spleen and liver. Blood swarming with double malaria infection. Quinine injections intravenously did not control the fever, although the parasites disappeared. The tongue remained coated, expression dull, pulse not in proportion to temperature. Atropine test applied, result positive. Unfortunately in this case no other diagnostic test except clinical evidence was used, but this was undoubtedly a case of typho-malarial fever.

Case No. 2.—No. 45142. May 1924. History of fever for a week. Tongue thickly coated, bowels bound. Spleen enlarged. Patient comes from a heavily infected mosquito area, no malaria parasites found however; liver slightly enlarged and tender. Lungs clear. Quinine did not control the fever, the expression became dull, and slight discomfort was felt in the right iliac fossa on palpation. Atropine test positive. Widal reaction para A. 1-40 +++ : 1-80+++ : 1-160+++.

In this case the pulse came steadily down from 112 to 88 in three hours when the atropine test was applied.

Case No. 3.—No. 40095. May 1924. Fever for four days, slight rigor with each rise. Diarrhœa. Tongue thickly coated and dry, very offensive breath, spleen 2 in. below costal arch. Slight cough and a few rales in the upper lobes of the lungs heard on the back. Extreme restlessness, pain, discomfort and gurgling in the right iliac fossa. Temperature ranged between 102 and 103° and pulse between 100 and 104. Patient had from the onset the appearance of a man who was very ill. Atropine test positive. Widal reaction: B. typhosus, 1-80: +++1-160 +++. This patient had hæmorrhage from the bowel four times. At the time of writing, although he is convalescent and on a full diet with a liberal supply of extras, he is very emaciated, and only weighs 78 lbs.

Case No. 4.—No. 39735. June 1924. Duration of fever ten days. Extreme apathy. Headache. Bowels markedly constipated. Tongue red at the edge and tip, centre thickly coated, and dry. Gurgling in the right iliac fossa but no pain or tenderness or discomfort. Spleen enlarged, increase in the large monos, 15 per cent.; no malarial parasites found, lymphocytes 34 per cent. Temperature resistant to quinine. Marris' test positive. Widal reaction Para A. 1-40 +++ : 1-80 +++ : 1-160 +++ : 1-320 +++.

I have never had any bad results follow an injection of atropine for this diagnostic purpose. The technique is simplicity itself, and all the appliance needed is a sterile hypodermic syringe, a tabloid of 1|50 gr. of atropine, 1 c.c. of distilled water, a swab of tincture of iodine, and a watch. One point, however, should as far as possible be carried out and this especially in the case of a nervous patient; he must be as composed as possible while the pulse rate is being recorded, both before and after the injection. At times it may even be

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necessary to sit and talk to a patient for five or ten minutes to drive all nervousness away from him. All my atropine tests were done between the 9th and 14th days of the pyrexia, and I may say that, apart, from the simplicity of the technique, another charm in the test is the saving of time.

I think this a most excellent means for diagnosing typhoid infection, and one at the disposal of all district medical officers.

A CASE OF SNAKE-BITE (*ECHIS CARINATUS*) TREATED WITH HYPERTONIC SALINE SOLUTION INTRAVENOUSLY.

By JEMADAR CHUHAR SINGH, I.M.D.,

Civil Dispensary, Hurnai, Baluchistan.

AT about 9-30 a.m. on the 10th June 1924, while cutting *pathha* leaves at a village about 3½ miles from Harnai Dispensary, a Pathan about 24 years of age was bitten by a snake.

At about 11 a.m. one of his relatives came to me on horse-back and requested me to go to the village and treat the man there. I urged him to bring the patient to hospital, but he did not agree, so I went to the village.

I arrived there at about 12-30 p.m. and found the patient outside the village in the shade of a hill. As soon as he was bitten, he had tied his leg with his pargi, but not tight enough to stop the circulation. Thereafter he killed the snake. There were two typical punctures on the right foot just at the base of the big toe. I incised the places with a scalpel, introduced potassium permanganate crystals, and gave the following mixture which I had taken with me:—

Spiritus ammoniæ aromaticus ..	drm.	i
Liquor strychninæ hydrochloridi ..	m.	iv
Tincture digitalis ..	m.	x
Aqua chloroformum . ..	oz.	i

I left two doses of the above mixture with instructions to repeat every four hours, and told his friends to bring the patient to hospital in the morning.

The symptoms and signs at that time were as follows:—

He was slightly drowsy and felt heaviness of the body, slight headache, and pain in the right leg and at the site of the bites. There were streaks of blood in his sputum.

11*th June* 1924. His friends brought the patient to the Harnai civil dispensary on a charpoy at about 1-30 a.m. He was now semicomatose, the pulse imperceptible, the extremities cold, pupils widely dilated, slight ptosis of both eyes present with profuse hæmorrhage from mouth, nose and from the incisions at the puncture sites.

2 a. m.—After a pint of hypertonic saline solution had been given intravenously his condition improved, the pulse was stronger and the patient said that he was feeling better, but the hæmorrhage from mouth and nose continued.

6 a.m. Condition again bad. A hypodermic injection of adrenalin chloride and pituitrin given, but not much improvement.

6-30 a.m. One pint of saline solution intravenously. Thereafter condition good; stated that he felt much better. He was very thirsty and cold water was given freely. Hæmorrhage as before.

12 noon.—Patient's condition again serious; pulse imperceptible, semi-conscious; pupils dilated but not so widely as before, ptosis less marked; hæmorrhage just the same.

A hypodermic injection of adrenalin hydrochloride and pituitrin was given and one pint intravenous saline repeated.

1-30 a.m.—Condition again very much improved; patient asked for a cold drink and said that he was feeling much better; pulse good; hæmorrhage still the same.

8 p.m.—Condition again very bad—apparently moribund. A hypodermic injection of pituitrin and adrenalin given and saline intravenously; but only half a pint was given this time as he moved his arm and the needle came out of the vein, but this improved his condition.

12 midnight.—Condition not satisfactory. One pint of saline given again

12th June 1924. 3 a.m.—Condition very much improved. Patient conscious, pupils normal, pulse good (rate 90). Hæmorrhage from mouth and nose stopped. He talked clearly and complained of pain in his abdomen.

Mist. Alba. oz. 1½ given, after which he passed three good motions.

7 a.m.—Condition good: wound dressed; rice and milk diet. Mist. Stimulant oz. 1 given.

13th June 1924. He felt very weak but otherwise well. He slept soundly for about four hours.

14th June 1924. Condition good; wound healing; patient sitting on his bed.

16th June 1924. He felt giddy, but was restored to comfort after the administration of a simple enema.

20th June 1924. Discharged from hospital cured.

Remarks.—The snake was an *Echis carinatus*.

[*Note.*—According to Acton and Knowles, 1924, (*Indian Jl. of Med. Res.*, Vol. I, No. 3, page 419) the estimated minimum lethal dose of *Echis* venom for man is about 10 mgms., whilst the dose given at a bite varies from 1 to 50 mgms. with a mean at 13.3 mgms. of desiccated venom. The chances of natural recovery after *Echis* bite are therefore some 40 per cent. The venom tends to cause more hæmorrhage and less thrombosis than is the case with Russel's viper venom. In the above case, it is clear that the patient received a lethal or almost lethal dose, and the author is to be congratulated on his careful treatment of the case and its successful issue. The only additional measure which one would suggest would be the administration of calcium salts either by the mouth or intravenously.—EDITOR, *I.M.G.*]

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A PSEUDO-ADDISONIAN SYNDROME.

By Capt. M. S. H. MODY, M.B., B.S. (Bombay), M.R.C.S. (Eng.), L.R.C.P. (Lond.), D.T.M. & H. (Lond.), Poona.

Roch, under the title of "The pseudo-Addisonian syndrome of old tuberculous, alcoholic subjects" has described a condition of which he has seen sixteen examples. It develops at the age of about sixty in alcoholic vagabonds of robust constitution. "The clinical picture is that of Addison's disease, including asthenia, pigmentation, and digestive disturbances, combined with symptoms of fibro-caseous pulmonary tuberculosis and hepatic insufficiency. The disease is rapidly fatal, and the autopsy shows cavitation of the lungs, sclerosis and fatty degeneration of the liver, but normal suprarenals." (*Medical Annual*, 1924.)

I recently met a case conforming to the above description: the patient having been to many medical men during the past six months, which term forms the duration of his illness; some pronouncing it as anæmia, and others attributing the condition to his previous alcoholic habits, (though so far his blood had never been examined).

Name—S. B. Age 55. Occupation—goldsmith.

He first consulted me on the 5th July 1924.

He looks much older than his age, extremely weak and emaciated, sallow tinge of the conjunctivæ and skin, highly anæmic (the appearances highly suggestive of pernicious anæmia). There were discolourations of a dark, almost blackish colour on the fingers and toes of both hands and feet, a patch of dark brown pigmentation on the forearms and a few on the mucous membrane of the mouth. His chief complaints were extreme and increasing weakness, loss of appetite, diarrhœa, dyspnœa, and distaste for food.

Previous history.—He admits gonorrhœa some 25 years ago but denies syphilis. Admits having been a very hard drinker until seven months ago, when he gave up alcohol altogether, thinking his symptoms were due to it.

Circulatory system.—Pulse 120, feeble and very small volumed. Apex beat at the fifth intercostal space in the nipple line.

No valvular lesion, except a well marked hæmic systolic murmur at the pulmonary orifice.

Blood pressure. 110, systolic: 70 diastolic; with a pulse pressure of 40, indicating quite an efficient working capacity of the heart.

Respiratory System.—Nothing important except harsh breathing at the apices and a very few rales at the angles of the right scapula.

Digestive system.—Tongue, foul. Breath, foul odour. Spleen, enlarged two fingers breadth. Liver, margin felt on deep palpation.

Diagnosis. The appearance of the patient was, as said before, very suggestive of pernicious anæmia, but two blood examinations done at an interval of ten days negatived this altogether. Addison's disease was the next most probable diagnosis, although I admit the systolic blood pressure of 110 points rather against it, and moreover Sergeant's white line was not obtained. The patient was put on suprarenal gland (fresh) B. W. & Co. gr. 5 twice a day, and increased to gr. 5 t.d.s. The effect of the suprarenal therapy was to improve the tension and volume of the pulse but it made the diarrhœa worse, so that he now had six to seven watery stools per day.

On the 19th July, 1924, I examined his sputum. One may note that his sputum was not examined until so late, as there were no physical signs in the lungs suggesting pulmonary tuberculosis, and the clinical picture so much resembled that of Addison's disease that as a last resource the sputum was examined, and to my surprise was found full of tubercle bacilli, together with the usual other flora found in association: but the number of tubercle bacilli in each field formed the outstanding feature, as much as 8 to 10 bacilli in each field.

This case I think, well conforms to Roch's description of "The pseudo-Addisonian syndrome of old tubercular alcoholic subjects."

AN UNUSUAL CASE OF SPINAL SYPHILIS.

By M. L. KUNDU, M.B. (Cal.),
Tharrawaddy, Burma.

Moung Ba Gyi, a Burman male, aged 26 years, was admitted into the Tharrawaddy Hospital on 13th January, 1924, with irregular pyrexia and pain in the lower abdomen, from which he had been suffering for a week. The pain in the abdomen was bilateral and rather vague and was attended by obstinate constipation. There were no signs of intra-abdominal inflammation, and on the third day after admission he developed paralysis of the detrussor urinae and was unable to void urine. On the fifth day he developed paresis of the left leg and his right leg followed suit two days later, so that a week after his admission into hospital he was totally helpless in his lower limbs. His abdomen began to distend and his constipation could only be relieved by copious purgatives and intravenous pituitrin. On the ninth day after admission he showed slight paresis of his hands and often complained of a choking sensation in his chest. The knee jerks were lost, and there was no Babinski reflex.

The patient had an attack of syphilis eight months before, for which he underwent a course of imperfect and non-continuous treatment, which also included two intravenous injections of novarsenobillon, 0.45 gramme and 0.6 gramme respectively. This cleared up the symptoms and gave him a false sense of security. He recovered so far as to be able to play football throughout the whole season of 1923, the patient being a good athlete.

I treated the patient in the beginning as a case of the milder form of the acute ascending paralysis of Landry, of which disease I have met several cases in Burma, and the last one of which gave me gratifying results on

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repeated lumbar punctures. This patient, however, made little improvement, but the clue to the diagnosis was given by the result of examination of his spinal fluid by the Pasteur Institute of Rangoon, which yielded a strongly positive Wassermann reaction. This was positive in spite of two further doses of novarsenobillon, 0.3 gramme and 0.45 gramme respectively, given by me within a fortnight of my removing the fluid sent for examination. In fact, the fluid was sent for bacteriological examination primarily, and only the history of the case apparently suggested a Wassermann examination to the Pasteur Institute authorities.

I made up my mind now to give salvarsanised serum intrathecally as treatment and gave 0.45 gramme intravenously at 8 a.m. on 16th February, 1924, drew 25 c.c. of his blood from his vein at 11 a.m., separated the serum, mixed it with normal saline at 12 noon, withdrew 40 c.c. of his spinal fluid and injected the serum. He began to show marked improvement since then. His bladder began to act and he could move his toes on the third day. A second dose of salvarsanised serum given a week later helped him still further, so that in a month's time he could walk with the help of a stick. He was discharged on the 17th April, after a stay of over three months in hospital, practically cured.

Cases of progressive spinal paralysis in patients after intravenous neosalvarsan have been recorded, and so far as I know the paralysis has been directly attributed to the arsenic. It has been surmised that the condition produced was œdema of the spinal cord. I can recall to mind two such cases that happened in my experience of 15 years, and the fault was clearly attributed to the injection by every one who was consulted. The case described here, however, raises considerable doubt as to whether these cases of progressive spinal paralysis can be so attributed. It seems clear that once the disease involves the spinal cord it is unamenable to routine antisyphilitic treatment, including intravenous 606, and it is more a coincidence than a result that the symptoms are exhibited simultaneously with intravenous injections. The progressive spinal paralysis found in this case was almost exactly the same as developed in the two other cases mentioned, a brief account of which may be of interest.

Case 1.—A Hindoo male, a Gujrati merchant in Rangoon, aged 24: sore appeared two months ago, secondary eruptions and fever developed a week ago. First and second intravenous injections of 0.45 gm. and 0.6 gm. respectively given with due care and precautions greatly improved him. The rashes disappeared and the temperature became normal. In the third week of treatment 0.75 gm. was given and on the second day after injection, the patient began to get drowsy, complained of headache. Paralysis of the bladder set in, followed by paraplegia, which deepened, and even loss of sensation. Recovered after three months of rest, purgation and elimination.

Case 2.—A Mahomedan male, a Surati merchant, aged 26. Sores appeared one and half months ago, had arthritis and fever. First and second intravenous injections given with due care of 0.45 gm. and 0.6 gm. respectively. The first one gave a terrible Jerisch-Herxheimer reaction, the second one a milder one, fever lasting for a day only. After the third injection of 0.75 gm. of neosalvarsan he had fever, and on the third day he developed paralysis of the bladder and paraplegia with headache. He was removed to the paying block of the Rangoon Hospital, where after a very prolonged stay he partially recovered and left for India.

This present case illustrates therefore:

(i) That progressive spinal paralysis met with in cases of syphilis while undergoing 606 treatment is more likely to be a manifestation of the disease itself, which has reached the central nervous system, than a result of arsenical treatment.

(ii) That such conditions do not contra-indicate further treatment with neosalvarsan, provided the vascular and excretory systems are normal.

(iii) That such conditions are not readily amenable to routine anti-syphilitic treatment, and are only amenable quickly to repeated lumbar punctures and intrathecal injections of salvarsanised-serum.

(iv) The spinal fluid remains Wassermann positive, even after repeated neosalvarsan injections.

A CASE OF ESOPHORIA AFTER TYPHOID FEVER.

By Capt. K. SEN, M.B.,

Chittagong.

K. K. C., male adult, aged 35 years, well nourished but rather anæmic, came to see me complaining of diplopia of two months' standing. His vision had been perfect prior to a recent attack of typhoid fever, the diplopia having been first noticed during convalescence from this attack. He saw well with each eye individually but had double vision when using both eyes together, for both near and distant objects. Indeed whilst walking on the road, he had to close one eye.

On examination both eyes were found to be normal with regard to examination of the conjunctiva, cornea, iris, tension, vitreous, and fundus oculi. No strabismus could be detected. All movements of both eyeballs were apparently normal.

Vision. Right eye = 6|6ths, type 2 at 12″.
Left eye = 6|6ths, type 2 at 12″.

The rod test showed esophoria, and the prism test indicated esophoria to the extent of 8°. On dividing the prism 4° for each eye, with the bases of the prisms outside, the diplopia was completely corrected for both near and distant vision. These prisms were ordered about a month and a half ago. At present

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there is no change in the eyes, and no tendency towards convergent strabisums, also no tendency towards any change in the muscle power of the recti. He sees perfectly well with the prisms on and carries on prolonged near work (as a student) with no discomfort.

A CASE OF HYDROA GRAVIDARUM.

By Capt. A. GUPTA, M.B. (Cal.), Calcutta.

As this disease is exceedingly rare, a few notes about the main features of the affection may be given.

"Hydroa gravidarum," as the name implies, is a bullous cutaneous eruption which develops in pregnant women, terminating as the pregnancy terminates, to return should the patient again become pregnant. Different views have been put forward by different observers as to the actual causation of it, but the general consensus of opinion is that it is in reality "Durhing's disease" modified by pregnancy. The knowledge of the fact that it is due to the pregnant condition is important, for when the symptoms become severe and are rebellious to ordinary methods of treatment, one is confident that an immediate premature induction of labour is justifiable.

The condition known as "impetigo herpetiformis of Kaposi" is the same affection in a different form, but differs in that the prognosis for both mother and child is grave, often leading to a fatal issue in both.

The case under description ran a comparatively mild course. The history is as follows:—

Mrs. B., aged 27, was referred to me by Dr. Sisir Kumar Bose in November 1923, for some sort of skin eruption which developed suddenly. The patient was in an advanced pregnant condition. The lesions were distributed irregularly on the trunk and extremities, but more marked on the flexor aspects than on the extensors. On examination I found that they consisted of typical grouped vesicles on patches of erythema. The contents of the vesicles were clear. The patient was not having any fever. She complained of itching which interfered with her sleep. She was given an alkaline aperient and vinum antimonialis to check the activity of the disease; potassium bromide to induce sleep, and a sedative and anti-pruritic lotion for local application. The condition responded well under this treatment, but the lesions did not quite disappear until the termination of pregnancy which came about in a week's time. Dr. D. R. Das who conducted the labour kindly informed me that the patient gave birth to twins. The interesting part about this case is that this was her third pregnancy, and while the patient had no cutaneous manifestation in her previous pregnancies, the present condition was apparently evoked by twins in the uterus.

THE TREATMENT OF PUERPERAL TETANUS.

By NAGENDRA NATH GHOSH, L.M.P., Kidderpore, Calcutta.

The treatment of tetanus during the puerperim, when the site of infection is in the uterus, differs from that of traumatic tetanus, as local treatment is practically impossible and we have to rely chiefly on general treatment. I have successfully treated a few cases of puerperal tetanus with intravenous injections of antitetanic serum (Parke, Davis & Co.). I have not kept any record of some cases successfully treated a few years ago, but may cite the following case, which recently came under my treatment.

On the 28th January, 1924, I was called in to a patient in Kidderpore, 28 years of age, lying prostrate on the *katcha* floor of a house. She had been delivered of a dead child two hours previously and the cord was being tightly held by a *Chamar* midwife with her dirty hand. As the patient was a *purdahnashin* lady, I could not proceed further, but sent for a Corporation midwife, who completed the third stage manually. I then gave 1 c.c. of pituitrin as the uterus was still bulky and the patient much prostrated. The midwife informed me that there was no tearing of the external genitalia.

She did well for the next five days. On the morning of January 26th, she felt some tightness of the jaws and slight pain in the body, but this was ascribed to cold. The symptoms gradually became more severe and on the morning of January 28th, I found her in opisthotonus with complete lock-jaw. She was getting exacerbations of the tonic spasm of the muscles of the whole of the body very frequently, and with each such acerbation screamed with agony. She was unable to take even fluid nourishment. I gave 1,500 units of antitetanic serum into the gluteal muscles, and 3,000 units the same evening, also into the gluteal muscles. She was also put on to the usual potass. bromide and chloral hydrate mixture, every four hours.

On January 29th, her condition was the same. I gave 1,500 further units, this time intravenously. The patient could swallow neither fluids nor even the mixture prescribed.

On January 30th, the only improvement noticed was that the exacerbations of the spasm were less frequent, but the lock-jaw was still complete. A further 1,500 units was given intravenously, and, as she had had no sleep for the past four days, I gave her an inhalation of chloroform, which induced sleep.

On January 31st, I found her much better. She had had two hours sleep, could open her mouth and take fluids and medicines. I gave a further 1,500 units of serum intravenously and again an inhalation of chloroform.

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On February 1st the muscles of the extremities were relaxed, though there were still occasional spasms of the muscles of the back. Only slight stiffness of the jaws now remained. She slept well this night.

From February 2nd to February 6th inclusive, I gave her a daily intravenous injection of 1,500 units of serum, as she still suffered from occasional spasms of the muscles of the back and thorax. I attended her last on February 8th, when she was completely free from spasm, could take a full diet, and was able to sit up.

The following are the chief points of interest in the case:—

(1). The intravenous mode is by far the best and quickest.

(2). Less serum is required for a good result by this than any other method.

(3). Despite the repeated intravenous administrations, there were no bad results.

The intravenous route is the one which should always be adopted for such cases.

A CASE OF ATRESIA OF THE VAGINA AND UTERUS.

By G. D. MADHOK, L.R.C.P. & S. (Edin), L.R.F.P. & S. (Glas.) L.M. (Dub.), D.P.H. & D.T.M. (Liverpool).

Jaffirbund, P. O., Cachar, Assam.

A GIRL aged 15 years sought advice for an abdominal tumour of one year's duration. She had never menstruated. The tumour was regular in outline and of a soft œdematous consistence. It gave a dull percussion note, was half-way to the umbilicus and slightly painful. By combined rectal and abdominal examination, the uterus could not be made out and the abdominal swelling was found to be incorporated with it. Hæmatometra was diagnosed and she consented to undergo an operation.

A vertical incision was made just below the external urethral meatus and the vagina was found to be well developed. There was no hæmatocolpos. The uterus was fixed to the vagina by a few adhesions and there was no evidence of the cervix. The uterus was set free and pulled down by a vulsellum. A small dimple at the position of the os was observed. A trocar was passed into the globular uterus and a large quantity of dark viscid fluid escaped. The vaginal portion of the posterior wall of the uterus was then incised vertically in the middle line, and to secure the permanent patency of the uterine canal, catgut sutures were introduced on each side in such a way as to fold the raw edges on each other. The vaginal incision was stitched up antero-posteriorly to permanently enlarge the orifice. The uterus and the vagina were loosely packed with gauze and the patient made a speedy recovery. When recently seen she was in perfect health and menstruating regularly.

SPECIAL ARTICLE.

REPORT ON THE SURGICAL WORK AT THE MADRAS GOVERNMENT GENERAL HOSPITAL, 1923.

By E. W. C. BRADFIELD, M.S., F.R.C.S., LIEUT.-COLONEL, I.M.S.,

First Surgeon, Madras Government General Hospital.

I. CANCER.

THE following tables show the admission for cancer into all the surgical wards of the hospital during the past five years.

Statistics for sarcoma are not included.

TABLE 1.

Number of admissions for cancer for the period of five years ending 1923, with results:—

—	1919.	1920.	1921.	1922.	1923.
Cured	31	18	20	22	29
Relieved	1	3	6	8	26
Otherwise discharged (Inoperable).	29	29	22	37	51
Died in Hospital ..	5	7	7	13	18
Total ..	66	57	55	80	124

TABLE 2.

The percentage of cancer among the different races to total admissions into hospital for the period of five years ending 1923, was as follows:—

—	Europeans.	Hindus.	Muhammadans.	Other castes.
Total admissions for the five years.	9,221	24,227	2,422	7,160
Total cancer for the five years.	36	288	23	35
Percentage for the five years.	0·37	1·19	0·95	0·48

TABLE 3.

Occurrence of cancer by site, race or caste, 1923:—

—	Hindus.	Europeans and Anglo-Indians.	Indian Christians.	Muhammadans.	Other castes.	Total.
Tongue and floor of mouth.	7	2	..	..	..	9
Jaws	13	..	..	1	2	16
Cheek	28	2	1	5	1	37
Lips	2	..	..	1	..	3
Breast	7	1	..	..	..	8
Penis	17	..	..	1	..	18
Uterus	1	..	..	..	..	1
Anus and rectum ..	2	1	..	..	1	4
Stomach	6	..	..	2	..	8
Intestines ..	4	..	..	..	..	4
Larynx	1	1	..	..	..	2
Oesophagus ..	1	2	1	..	..	4
Liver	2	..	..	..	1	3
Bladder	1	..	..	..	1	2
Skin	3	..	..	..	..	3
Other parts ..	3	..	..	..	..	3
Total ..	98	9	2	10	5	124

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The tables are interesting, as giving a fair idea of the incidence of the disease in Madras, but are not complete since we are unable to include statistics from the out-patient department, where many inoperable cases, especially affecting the mouth, present themselves for treatment. Cancer would appear to be slightly more prevalent among Hindus than among other races and castes—(Table 2)—but this is due to the higher incidence among them of carcinoma of the mouth and of the penis, the most frequent sites for the disease in this Presidency. The low incidence among Europeans, and Anglo-Indians was unexpected, but is due to the same cause.

Cancer of the Mouth.—A rough examination of the mouths of hospital patients will reveal the fact that about 80 per cent. of them have infected teeth, and that quite a number, 8 to 10 per cent., exhibit patches of leukoplakia or chronic glossitis. These patches are found on the inside of the cheek, most frequently leading to the angle between the cheek and lower jaw and are in many cases a pre-cancerous condition. They occur among the poorer classes, a result of continuous betel chewing, a chronic irritation being produced by the coarse lime (*chunam*) with which the nut is mixed. When cancer supervenes, these areas become ulcerated. The disease spreads widely, rapidly, and insidiously in the submucous layer, in the buccinator muscle, whence it involves the periosteum of the upper and lower jaw, and occasionally spreads backwards towards the pterygoid region, this last being difficult to detect and an incident of very grave prognosis. The glands, submaxillary, and upper cervical, as a rule become infected late, though frequently enlarged and inflammed. Previous hospital reports have commented upon the numbers of patients presenting themselves in advanced stages of this disease, upon the high mortality which results from operation and upon the frequency with which recurrences are detected even before such patients can leave hospital. The condition of these patients is extremely distressing, they cannot open their mouths, which contain an ulcerating foul-smelling growth, absorption of septic material from which rapidly undermines their health, while its smell makes them a nuisance to their neighbours. They implore the surgeon to do something for their condition, often asserting that any risk is worth taking to rid them of their cancer, and undoubtedly a wide removal, even though some growth remains and will recur, will produce extraordinary relief. The gap in the cheek which is not closed allows free escape of the discharges, while the division of the nerves which necessarily occurs during the operation is a great factor in the resulting freedom from pain. We have tried injecting the Gasserian ganglion through the foramen ovale with alcohol in some of these advanced cancers, but the results have not been satisfactory.

The operations performed for cancer of the mouth during the year were:—

—		No. of cases.	Apparent complete removal.	Recurred.	Partial operation only.	Operation mortality.
Cancer of cheek	*Chunam cancer.*	8	3	4	1	Nil.
Cancer of cheek and lower jaw	*Chunam cancer.*	5	2	2	1	Nil.
Cancer of tongue ..		2	1	1	Nil.	Nil.
Cancer of floor of mouth ..		1	1	..	..	..

The average age of the *chunam* cancer cases was 44 years, the oldest being 64 and the youngest 35, while 7 were males and 6 women patients. Recurrence took place in the wound in 3 patients; in the pterygoid region, in 3 patients; in the lower jaw, 1 patient; and in the upper jaw, 1 patient.

At first sight these results are most discouraging, only mitigated by the knowledge that very great though temporary relief has been given in what is one of the most distressing of diseases. They bear out what has been the usual experience with these patients for some years and which has suggested that operative treatment holds out very little hope of cure in this type of cancer. "Follow up" efforts are notoriously difficult in India, but amongst the answers received from our recent attempt to trace all our 1922 patients, was one from a patient operated on for a moderately advanced cancer of the cheek 2½ years ago and who now reports himself perfectly well, a result which shows that this disease can be cured.

A record of 13 of these operations without a death, considering their known high mortality when the lower jaw is removed, and which in 1914 I reported as being as high as 42 per cent. in the women's wards over a period of several years, is evidence of that luck which sometimes follows a surgeon; but our routine method of procedure has had a considerable influence. It is often impossible to remove or clean up the teeth before operation and without splitting the cheek, but a preliminary laryngotomy reduces the risk of bronchopneumonia and a preliminary injection of novocaine into the Gasserian ganglion, of shock; and enables us to operate with a minimum of general anæsthetic. Our later cases have all had the advantage of the diathermy cautery; and the results have so far been extremely encouraging. The cancer of floor of the mouth reported in the above table was a very advanced condition in a European, who was sent up from another province in the hope that something could be done. There was a large fungating growth involving the floor of the mouth, with its usual distressing accompaniments, and huge glands in the submental region. The growth on section proved to be a typical epithelioma. The tumour was very freely cauterised with the diathermic cautery on three occasions; the last occasion destroying part of the lower jaw, the necrosed area of which has only recently separated. His doctor now reports, "16 months ago this man had an inoperable carcinoma and to-day he is earning a living running two motor lorries, there is no sign of recurrence."

One patient had a hard epitheliomatous ulcer at the junction of the middle and posterior third of the tongue. After a preliminary operation to remove the glands and tie the lingual artery, the tongue was split along the anterior half, the removal completed with a diathermic cautery, and the area of the wound deeply cauterised. Satisfactory removal would have been impossible with knife or scissors, and the appearance after sloughs separated was excellent, though it is too early to say what the final result will be.

This method of surgical removal with the diathermic cautery is too well known to warrant description, but it appears to be especially suitable for malignant growths in the region of the mouth. In dealing with these *chunam* cancers, the most satisfactory procedure is to use a knife for removal of the growth with a wide margin and to include the glands of the submaxillary triangle where possible, the danger of shock having been averted by the free use of novocaine. The operation is then completed by a free diathermic cauterisation of the wound area using a button cautery, and paying special attention to the area leading to the pterygoid region. The sloughs which result from this treatment take 6 to 14 days to separate, but there is little or no smell and much less disturbance to the patient than would be expected. It is early to report the final results, but this method is far more promising than any others that we have attempted for these very malignant growths. We have obtained very little advantage from *x*-ray treatment in inoperable cases, but a series of regulated exposures is given after all these operations.

Cancer of the Penis.—This form of cancer is fairly common in Madras, and 8 operations were performed in my wards during the year with one death, a patient

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aged 55, who died on the 13th day with advanced disease of both kidneys (pyonephrosis). The average age of these patients was 54 years, the oldest being 65 and the youngest 40; one patient was a Mussalman. Operative treatment gives very good results in this form of cancer and we were able in 1921 to trace patients who have remained well for several years. Of late, however, the necessity for removal of the inguinal glands has not been sufficiently impressed upon patients, an idea having grown up that the disease very rarely recurs. Recently our optimism in this respect has been rudely shaken, for two patients, one operated upon in another hospital and one in our own wards, presented themselves with large inoperable growths in the glands. It is difficult to remove the glands with the penis, for these are old patients often of poor operative risk and the danger of sepsis is considerable. For the same reason they are anxious to leave hospital as soon as the tumour has been removed and their wound healed. Removal of these glands at a first operation is the safest procedure, but there is always risk of sepsis in this area, especially in the presence of a fungating growth.

The results of operation for cancer of the penis are invariably good, but a note of warning is necessary as to this danger of recurrence in the inguinal glands.

Abscess of the Liver.—For some time now it has been the routine practice of this hospital to treat all cases of abscess of the liver by aspiration, followed by a course of emetine treatment. The result of these methods has been entirely satisfactory and a comparison of the results obtained during the 10 years 1912 to 1921 with those obtained during the past year is very instructive. During the former period of 10 years 171 patients were operated upon in the Ceneral Hospital for abscess of the liver, of whom 31 died, a mortality of 18.1 per cent. During the past year 33 patients were operated upon for abscess of the liver, of whom 2 died, a mortality of 6.3 per cent. These two patients who died, illustrate in the one a difficulty of diagnosis and in the other a warning necessary regarding this treatment. The former patient was admitted with symptoms which pointed entirely to a gastric condition. He complained of pain after food, had a tumour in the left side of the abdomen and was acutely ill. Laparotomy was performed and a large rounded tumour was discovered growing from the left lobe of the liver and fixed to the upper border of the stomach, which organ was small and almost hour-glass in shape. The tumour on aspiration proved to be an abscess. This patient followed the course which so often follows drainage of a liver abscess in a patient acutely ill. The abscess became septic and in spite of all efforts the patient died of septicæmia. A better treatment would have been to close the laparotomy wound and aspirate the abscess from behind.

The second patient was also admitted, acutely ill and with symptoms pointing to an abscess which had ruptured into the lung. He was aspirated on two occasions and was so improved in his condition that he declined further treatment and left the hospital. He returned to the hospital after two months again acutely ill and with a large septic empyema, which necessitated drainage and ended in death of the patient. There is no doubt whatever that treatment by aspiration is an enormous improvement on older methods and that with improved confidence in this treatment the first patient operated upon would probably have recovered with a suitable aspiration. The condition of many of these patients, who were admitted, was very grave. The notes of one patient state that "this patient was practically moribund on admission but recovered in an extraordinary way after aspiration of 10 ounces of liver abscess pus." Frequently more than one aspiration is necessary to bring about a cure.

Eleven cases recorded in my own wards show that a cure was registered after one aspiration in five patients, after two aspirations in three patients, after three aspirations in two patients and after four aspirations in one patient. The danger with Indian hospital patients is that there is such immediate and rapid improvement after aspiration of a liver abscess that they frequently consider themselves cured and insist on leaving the hospital, only to return at a later date with the abscess re-filled or because of further complications occurring.

Diseases of the Stomach.—Ulcer of the stomach and duodenum is now very readily recognized in this hospital, and the prevalence of this disease is shown by the fact that during the year under review no less than 226 operations were performed for these diseases by six surgeons. In my own wards 50 patients have been treated as follows:—

Disease.	No. of patients.	Died.	Mortality rate per cent.
Duodenal ulcer ..	46	3	6.5
Gastric ulcer ..	2	Nil	Nil
Cancer of the stomach ..	2	1	50

Of the above, 2 were patients admitted with acute perforation of duodenum. One was operated upon 2½ hours after perforation occurred and the second 19 hours. Both recovered, although the second had a somewhat stormy convalescence. The symptoms shown by these patients show nothing of special note other than what was reported last year. Visible peristalsis was noted as present in 32 of these patients, showing the advanced general condition in which they seek hospital treatment. The average duration of symptoms is 3.5 years, the longest being 20 years and the shortest 6 months. One patient only was a woman, a desperate case suffering from cancer of the stomach (pylorus) and who died as a direct result of the operation. The mortality rates in these operations have been steadily improving during the last year, a result largely due to the absence of pneumonia following the operations, and to the experience which the nurses in the post-operative wards have received in this class of patients. The desperate condition to which these patients have arrived before coming to the hospital is shown by a record of their weight. No less than 21 of these patients weighed under 80 lb. while one weighed only 40 lb., a man of 22, and two others weighed 65 and 64 lb. No less than 28 are noted as suffering from pyorrhœa or from a septic condition of the teeth and I consider that the very careful attention which we now give to the mouths of these patients has been mainly responsible for the almost total disappearance of post-anæsthetic lung trouble. The average age was 35 years, the oldest being 60 and the youngest 16.

Posterior gastro-enterostomy, vertical no-loop method, has been performed in all these cases, and the appendix has been removed as a routine except in 7 where the condition was too desperate to warrant the extra procedure. The microscopic reports obtained of 36 appendixes so removed showed that 18 were normal, 12 showed evidence of chronic inflammation and 6 contained thread worms. A further careful investigation of this last figure during the past few months has shown that a much larger percentage of appendices in India contain thread worms. If the appendix is placed in preserving fluid and sent to the pathologist for microscopic examination, the thread worms are generally missed, but if examined at the time of operation we rarely fail to find one or several thread worms in the organ. This together with the high percentage of septic infection of the mouth (28 in 46 patients having pyorrhœa or infected teeth) is still considered a possible source of the duodenal infection and ulceration. It is difficult to assign any other cause for the high prevalence of this disease amongst people in South India, although it must be remembered that the General Hospital draws its patients from over a wide area.

As to caste, only 3 of these patients were Indian Christians, 3 Muhammadans and the remainder, 40, Hindus, but this figure is really of no special value.

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(1) Four patients died as the result of the operation, one following the operation for cancer, really an inoperable case but in whom an almost complete stenosis of the pylorus due to gastric cancer rendered some method of relief imperative. (2) One died of chronic sepsis with intestinal obstruction 22 days after the operation. It was difficult to account for this, as there was no leakage from the anastomosis and the sepsis was of a very low grade. (3) One patient died suddenly of heart failure 8 days after operation and post-mortem elicited the fact that he had advanced atheroma of the coronary arteries and that death was due to sudden heart failure. (4) This patient also was severely ill, and died apparently from shock following the operation. In addition to the duodenal ulcer he had a chronic cholecystitis and experience has proved that this type of patient runs a very much graver risk than one whose liver is not affected.

Hernia.—Fifty-two operations, classified as follows:—Right inguinal hernias 25, left inguinal 12, recurrent hernias 6, ventral hernia 1, direct inguinal hernia 4, (sliding hernias 4), irreducible 1, strangulated hernias 2, with intestinal 2.

The average age of these patients was 32, the oldest being 60. Of the recurrent hernias, in 5 Bank's operations has been performed, i.e., suture of the conjoined tendon to Poupart's ligament over the cord. Some years ago this operation was very frequently practised for the cure of inguinal hernia in Madras, and has of late years provided the great majority of recurrences seen in this hospital. The hernia recurs as a rule at the lower part of the canal, which is left open over the passage of the spermatic cord. In these 5 patients, the conjoined tendon had become firmly united to Poupart's ligament and I have seen no evidence to support the theory recently advanced that such union of muscle to ligament never takes place. The remaining case had apparently suppurated at the original operation and there was no attempt at union whatever. A sliding hernia, a fairly common type of hernia in Madras, was found in four patients. Each had a right inguinal hernia containing the cæcum and ascending colon, which had prolapsed through the hernial ring, the posterior portion of the mass consisting of the intestinal vessels. No difficulty was found in any of these cases in pushing back the hernia and sewing up the ring, but in one patient in whom the hernia was strangulated the operation was fatal.

Appendicitis.—There were 29 operations for appendicitis, among the following classes:—Europeans 10, Anglo-Indians 9, Indian Christians 3, Hindus 5, Muhammadan 1 and Parsee 1.

One European, one Anglo-Indian and three Indian Christians were operated upon for chronic dyspepsia in whom only a chronic appendicular condition could be found, the removal of which was apparently successful in curing the disease.

One European admitted with severe gastric symptoms and persistent vomiting extending over three weeks was cured by the removal of a normal appendix which contained several thread worms. No other treatment was adopted and he has remained well since.

Four Hindus, one Indian Christian and one Muhammadan were all admitted with definite symptoms of acute appendicitis verified and cured by operation.

Fracture of the Spine.—In February 1922 I reported a case in the *Indian Medical Gazette* of fracture of the atlas vertebra, which was not followed by a fatal result. A similar case was admitted into my ward during the past year and was reported in the College Magazine by Mr. C. Krishnaswami Pillai, Assistant Professor of Surgery. The patient, a boy of 10, was admitted for paralysis and with a history that six months previously he fell from the top of a tree and remained unconscious for 24 hours. His symptoms cleared up in a day and he went about his work with hardly any discomfort. After two months, he noticed increasing weakness of both arms, which soon developed into paralysis of all his limbs.

On admission the patient was found to be suffering from marked paresis of all his limbs, with paresis of the abdominal wall, back and neck. Sensibility was unaffected, reflexes were exaggerated, and electrical reactions were normal. A bony tumour could be felt at the back of the neck, but not through the pharynx, which x-rays proved to be a thickened and displaced atlas vertebra. Diagnosis, fractured atlas vertebra with callus formation.

The patient was kept in bed with a weight extension fixed to the head, and after four months treatment was discharged from hospital with complete recovery.

"The nature of the injury is explained by the direction of the articular facets of the atlas vertebra and by the force producing the injury, which acts upwards by the weight of the body through the vertebral column. The articular facets of the lateral masses of the atlas are obliquely placed, the upper pair looking upwards, backwards and inwards, and the inferior pair downwards and inwards. The result of such a fall would be a horizontal force tending to cause separation of the lateral masses from each other and a consequent tension fracture at the weak points, i.e., the anterior and posterior arches."

Renal Surgery.—Operations on the kidney, 4. Two patients renal calculus, nothing present of note. One patient with a large suppurating pyelonephrosis died as a result of septicæmia after drainage had been established. The remaining patient presents a condition of considerable interest. A European, aged 33, was admitted for hæmaturia with a history that he had suffered from the same complaint on two former occasions and had been severely injured in the left loin by a shell during the war. Cystoscopy showed gushes of hæmorrhage issuing from the left ureter, but there was no ulceration or disease round the ureteral opening. The urine from the right ureter was normal in colour. As the patient was showing signs due to the continued loss of blood, operation was decided upon and the left kidney explored by the usual lumbar incision. The ureter and pelvis were distended with blood but no evidence of tumour, disease or stone could be found either in the kidney itself or in the pelvis, which was explored through an incision in the kidney. After a small portion of kidney substance had been removed for microscopic examination, its capsule was stripped and the wound sutured after leaving a small drain through the kidney wound. No other treatment was adopted. Following the operation, the urine became quite clear within 24 hours and the wound healed rapidly. The patient presented no further symptoms and was able to sail for England, apparently well, two months after the operation. Microscopic examination of the kidney specimen showed the affection to be a subacute nephritis (chronic parenchymatous nephritis—large white kidney).

Reviews.

APPLIED PATHOLOGY IN DISEASES OF THE NOSE, THROAT AND EAR.—By Joseph C. Beck, M.D., F.A.C.S., Associate Professor of Laryngology, Rhinology and Otology, University of Illinois College of Medicine. St. Louis: C. V. Mosby Co., 1923. 280 pp. 268 Illustrations. Price $7·50.

This is an admirable book, not alone for the nose, throat and ear specialist, but also for the general practitioner and the hospital resident. The fundamental object in the analysis and management of a case is—or should be—a definite knowledge of the underlying pathological changes present; too often is treatment in nose, throat and ear conditions purely empirical. Thus the ordinary practitioner looks for mastoid swelling in a case of otitis media, but may fail to appreciate that far more dangerous conditions such as septic thrombosis

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of the lateral sinus may occur with but few external signs. It is of the utmost importance for the practitioner to visualise the processes which are at work behind the changes seen; and nothing could be of more assistance to him in this than Dr. Beck's excellent book.

The book is not intended as a text-book; the author writes from a very extensive personal experience, and every chapter bears the imprint of the wisdom of this method. To compile a text-book by selections from other works is fairly easy; to present a handbook full of personal experience and its lessons is far better. Also a word must be said about the profuse illustrations in the book. They are in the first place numerous,—268 illustrations to 280 pages of text; secondly they are beautifully executed on art paper; and thirdly there are several very fine colour plates. Thus the colour plates of bulla of the membrana tympani in acute infection of the influenzal type, of incipient peritonsillitis and peritonsillar abscess formation, and of the membrana tympani in retrogression of acute otitis media could not be better. Perhaps the best plates are those dealing with the appearances in tonsillar disease and of the membrana tympani in acute otitis media; plates which teach almost more than the text.

We congratulate Dr. Beck and the publishers upon the production of this very valuable aid to accurate diagnosis in a field where work is all too apt to be slip shod. A handbook such as this should very much improve the standard of work in this important subject.

DYSPEPSIA AND ITS SELF-TREATMENT.—By Jadu Nath Ganguli, B.A., M.B. 1924. Benares: Biswanath Printing Works. 218 pp. Price Rs. 2-8.

This is an interesting and stimulating little book. The author has been in medical practice since 1879, and in the course of his lifetime of practice has culled knowledge from many different systems of medicine, and experience from the years. Also the book is interesting in that it is written by a Bengali for Indian readers, with a full understanding of Indian habits, diets, and customs,—and should therefore interest not only the Indian but also the European medical practitioner in this country. In brief it is like a well-matured and palatable vintage.

Some of Dr. Ganguli's remarks are delightful, and constitute perfectly true pictures of Indian daily life; "the judge on the bench, sitting immovably for many hours a day, sifting grains of truth from cart-loads of half-truths, so distresses his mind that he suffers from dyspepsia or its cousin, diabetes..... The statesman, the author, the editor, the merchant, all suffer in this way from sedentary habits and intense thinking"; we wish that we could feel so sure about the "intense thinking." Pages 22 and 23 contain a poem on the states of the tongue. "There is a heavenly pleasure in sleeping like an infant in an airy, noiseless, darkened room, when the world is yet full of busy bustle and the street air resounding with the rattle of vehicles,"—but we are afraid it is an unattainable pleasure,—in Calcutta city at least.

"Time flees, make haste, finish your work sooner and sooner,

But never make haste in your prayer or your dinner," is an admirable and original couplet of the author's. "A luncheon is a portion of food taken at any time between meals";—we feel that we know many people who take several luncheons a day. Of posture in bed "the left side for digestion, the back for thinking, and the right side for sleep" is the author's advice. And finally a classical but still delightful story of Sir Lauder Brunton's interview with a young woman, who, on being asked if her bowels were regular, replied "Yes, sir." Asked again "How often are they open?," she replied, "Once in three weeks, sir." In fact, if Dr. Ganguli is discursive in this little volume, his discursiveness is delightful.

"Our remedies oft in ourselves do lie," he quotes from Shakespeare on his title page; and the contents of the book proceed to apply this axiom. "All medicines for dyspepsia are only palliatives," a statement which is perhaps not very far from the truth; the cure lies with the patient, with self-education, self-control, a balanced life and a balanced diet,—lessons which the author proceeds to inculcate with special reference to Indian customs and diets,—facts which make his book particularly helpful. Thus the first essential is determination; "I will cure myself and nothing shall prevent me" he gives as a motto for the patient, and it is surely a better one than the much milder phrase of Coué-ism.

Throughout the book the author's ripe experience is evident on every page. Still more valuable is the way in which he clings to simple and really valuable remedies; to proper dieting, or fasting, to regulation of hours and meals, to exercises and massage,—all sound, sane and generally better remedies than the latest polyglandular preparation or a mixture of all the ferments. Chapter 5, on fasting, is really well written; there can be no question that a short total or partial fast is a pre-eminently sane cure for many cases of dyspepsia. Chapter 4, on the daily life for a chronic dyspeptic, should be read by every Bengali suffering from this distressing complaint. Everywhere throughout the book, the author's wide knowledge of Indian customs and habits lends added value to it; since the diets which he advocates are those suitable for Indian patients, without disturbing their usual daily routine. Dreams are often the result of impaired digestion, but we defy even a psycho-analyst to unravel the connection between the occasional allowance of butter which an aged officer in N. E. India could sometimes not avoid taking at breakfast, and the dreams of hunting excursions which invariably followed.

"Is dyspepsia curable?" asks Dr. Ganguli in his preface. His answer in general is that it is, if it be taken in time, if the patient will make up his mind that it is. And in his advocacy of a simple regimen and the simplest of remedies, he summarises the experience of nearly 45 years of medical practice. We trust that this little book will be widely read and studied; to the European practitioner in India especially we would commend it for study, since it deals so largely with suitable Indian diets and remedies.

HANDBOOK FOR THE USE OF DISPENSERS OR COMPOUNDERS IN CIVIL HOSPITALS. THE STANDARD BOOK FOR THE PUNJAB.—By Lt.-Colonel W. W. Jeudwine, I.M.S., 2nd Edition, 1924. English and Urdu, 92 plus 52 pp. Delhi: Laxmi Press. Price Rs. 2-8-0 post free.

This little and comprehensive book should be widely known, for it is a very useful one. It is written in both English and Urdu and is primarily intended for dispensers and compounders, but will be found useful by many sub-assistant surgeons and assistant surgeons in *mofussil* dispensaries. Also it forms a practical handbook to the grade examinations for compounders. It is written in a clear and simple style and well arranged. Chapter I deals with the use of stretchers and lifting patients: No. 2 with bed-making: No. 3 with the general comfort of the patient: No. 4 with nursing, hydrotherapy, bed sores and the detailed general care of patients: No. 5 with splints, hæmorrhages and surgical emergencies: No. 6 with dietaries: No. 7 with clinical methods: No. 8 with wards and furniture: No. 9 with the operation theatre: No. 10 with infant care and feeding: No. 11 with infectious diseases: No. 12 with sanitation: No. 13 with dispensing: No. 14 with X-ray work:—followed by notes on doses, poisoning, incompatible drugs, abbreviations in prescriptions and weights and measures.

As will be seen, it is a little volume which covers a very wide field and is of very general utility. It is also the official handbook for compounders in the Punjab.

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A MANUAL OF TRAINING FOR NURSES.—By Lt.-Colonel H. R. Dutton, M.R.C.P., M.R.C.S., D.T.M. & H., I.M.S., Superintendent, Temple Medical School, Patna. 246 pp. with 3-colour and numerous other illustrations. Calcutta: Butterworth & Co., India, Ltd. 1924. Price Rs. 6-8 net.

As far as we know, prior to the publication of this little manual, there has been no volume at a cheap price, published in India and presenting to the nurse the essential information on those subjects with which a fully trained nurse should be familiar. We would further especially welcome this volume for its very good quality of paper, binding and general make-up. The different sections deal with general nursing, anatomy, physiology, elementary bacteriology, general medicine and surgery, including a full discussion of asepsis, inflammation, wounds—infected and otherwise,—hæmorrhage and its treatment, bandaging, gynæcology, obstetrics, the preparation for and conduct of labour and the puerperim, eclampsia, the care of the infant, toxicology and invalid cookery. The writing is throughout clear and straightforward, there is no redundant matter in the book, and it is one which admirably meets the purposes for which it is written. In place of having to digest matter taken from several different volumes, the probationer is here presented with such matter in a careful digest, whilst the fully trained nurse will find the book very useful for reference. Colonel Dutton's book is to be thoroughly recommended, whilst its price is moderate for so comprehensive a volume.

EXERCISES FOR HEALTH AND CORRECTION. By F. D. Dickson, M.D. and R. L. Diveley, M.D. 127 pp. 112 illustrations. London: J. B. Lippincott Co., 1924. Price 8s. 6d. Obtainable from Messrs. Butterworth & Co., Calcutta. Price Rs. 6-6-0 net.

THIS sumptuous little manual fills a long-felt want. It is not written to exploit some special cult or system; neither does it attempt to deal with such conditions as scoliosis and ankylosis, where exercises should be carried out under skilled and trained supervision. On the other hand, it is essentially a book for the general practitioner, and above all, one that he can put into the hands of his patients for their self-instruction. The written text is brief—the profuse illustrations giving a much clearer explanation than would pages of text. All of them are photographs, shewing the exact movements to be undertaken.

There are five sections in the book:—(1) Bed exercises to be carried out by the patient who is debilitated after long illness: (2) Exercises for improving general tone and stamina,—setting up exercises: (3), (4), (5) postural exercises for children, for adults and for the spinal treatment of poor carriage, visceroptosis, the training of defective muscle groups and for foot conditions where lack of muscle balance is present, such as flat-foot and fallen transverse arches.

We have nothing but praise for this little book, which will be welcomed by general practitioners, patients, school teachers, Boy Scout, Girl Guide and similar organizations, and which should appeal to a wider circle of followers of the cult of fitness.

WHEELER'S HANDBOOK OF MEDICINE.—By William R. Jack, B.Sc., M.D., F.R.F.P.S.G., Physician to the Glasgow Royal Infirmary. 7th Edition, 1924. Edinburgh: E. and S. Livingstone Co. 629 pp., 34 illustrations. Price 12s. 6d. net.

THIS handbook is—or should be—well-known in India, for it is almost a "pocket Osler," concise, well written and published, and eminently suitable both for the medical student and the general practitioner. No less than ten new editions or reprints have been called for in the last twenty-one years. In brief this book is of value both for final reading before examinations and for reference.

The new edition presents material alterations from the 6th edition. New articles are included upon *B. coli* and pneumococcus infections. The article on diabetes mellitus has been re-written and includes full information with regard to tests for the renal threshold and an account of the use of insulin. The article on jaundice has also been almost entirely re-written in view of recent work on acholuric jaundice; the section on cardiac diseases has been considerably enlarged; whilst the section on nervous system diseases includes new articles on encephalitis lethargica, progressive lenticular degeneration, apraxia and other syndromes. Throughout the book the information is well up to date; thus the section on syphilis includes an account of the *sigma* reaction, and a succinct account of the diagnosis of congenital syphilis.

With regard to tropical diseases, although these naturally do not figure largely in a text-book of general medicine written in Great Britain, yet we are pleased to find that the information given is both accurate and up-to-date. In this respect indeed the book is a welcome change from several larger works on general medicine which fail to incorporate recent work in tropical medicine, and from such mistakes as that committed in a recent edition of a well-known handbook in referring kala-azar to the piroplasmoses.

The book is one which we can cordially recommend to both the medical student and the practitioner as a concisely written, reliable and up-to-date volume.

THE TREATMENT OF DIABETES MELLITUS.—(With observations based upon 3,000 cases). 3rd Edition, 1924. By Elliott P. Joslin, M.D. Harvard Clinical Professor of Medicine, Harvard Medical School and Consulting Physician, Boston City Hospital. London: Henry Kimpton. Pp. 784. Price 36s. net.

PROF. JOSLIN has done valuable service to the profession in publishing this third and much enlarged edition of his well known book. Many chapters of the new edition are entirely re-written and a very important section on insulin, containing details of its discovery and of the methods of treatment by this drug, has been added. References have also been made to previous and contemporary researches in pancreas therapy. The whole section on insulin covers 100 pages and it forms useful and interesting reading. Dr. Joslin has even given the minute details of carrying out insulin treatment. There is one fact, however, which would strike a critical reader while going through this chapter and that is that there is no mention of workers in England.

The section dealing with the examination of the urine, blood and respiration in diabetes will amply repay perusal. The author lays great emphasis on the desirability of the urine examinations being simplified, but at the same time made scientific and inexpensive so as to be accessible to all classes of patients. His views on the subject are contained in the following words:—"When I see two or even four full pages covered with a single urinary report and padded printed matter, yet showing on the face of it that modern analytical methods were not employed, I blush for the profession." He advises that the patients themselves be taught how to do qualitative *Benedict's test* for sugar.

Professor Joslin's book is full of useful information and it is sure to prove of great value to the general practitioner.

J. P. BOSE.

MEDICAL GUIDE FOR INDIA AND BOOK OF PRESCRIPTIONS.—By Lieutenant-Colonel E. J. O'Meara, O.B.E., F.R.C.S. (Eng.), D.P.H. (Camb.), I.M.S. (ret.). 2nd 1924 Edition, Calcutta: Butterworth & Co., India, P. O. Box 251, Calcutta. 695 pp. Price Rs. 12.

IT is pleasant to be able to welcome a second, revised and very up-to-date edition of Colonel O'Meara's

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well-known volume. First published in 1920, it is a veritable *vade mecum* for the medical practitioner in India. Its object is "to give to all classes of practitioners in India a brief, compact book of reference for questions arising in the course of their daily work." This object the book is eminently successful in achieving; there is scarcely a question from the treatment of snake bite or the use of radium to the method to be adopted in sending the brain of a suspected rabid animal to a Pasteur institute for examination or the selection of a nursing home in a presidency city or in the hills that the book does not cater for. It is a veritable compendium valuable for reference in every phase of medical practice in India. The sections include prescriptions and outlines of treatment in different diseases,—263 pp.;—food and dietetics in India; surgical notes; first aid; maternity notes; sanitation; medico-legal work and insurance; clinical laboratory methods; lists of hospitals, nursing homes, nurses, etc.; pharmaceutical notes and tables; and miscellaneous information, including veterinary notes.

Further, this edition is very thoroughly up-to-date. Sir Leonard Rogers has revised the sections on malaria and cholera; Colonel Kirkpatrick that on diseases of the eye; Mr. Arthur Braine has contributed an article on electro-therapy, radiotherapy and radium; Major Frost, R.A.M.C., information on methods of treatment of syphilis in the British Army.

The edition is well got up, well printed, well indexed and shews most painstaking care in revision and re-writing. Colonel O'Meara's book should be almost the daily friend of the medical practitioner in India, and in its new edition we trust that it will have a very wide circulation.

INTERNAL DERANGEMENTS OF THE KNEE JOINT.—By A. G. Timbrell Fisher, M.C., F.R.C.S. (Eng.), p. xii+144; illustrations, 80 on 40 Plates. Size Demy 8vo. Price 12s. 6d net. H. K. Lewis & Co., Ltd., London, 1924.

The author sets out in this work the present state of our knowledge concerning internal derangement of the knee joint and gives a brief account of some of his researches into the pathology, diagnosis and treatment of this complicated condition.

In a foreword, Sir Arthur Keith strongly commends the treatise to "every one who is engaged in the general practice of medicine." The great merit of the book is that it approaches the whole subject from an independent standpoint based on original investigations on the knee joint.

Part I deals with the semilunar cartilages; the history of internal derangement, surgical anatomy, pathology, symptomatology and treatment. Part II describes the pathology and surgery of other varieties of internal derangement, e.g., loose bodies, osteo-arthritis, etc.

Every student of medicine, and the practitioner is also a student in the best sense, will welcome this book and read it with pleasure and much profit.

A HANDBOOK OF SURGERY.—By George L. Chiene, M.B., C.M., F.R.C.S. Ed., Surgeon, Edinburgh Royal Infirmary. Crown 8vo. Pp. 592+xii, with 109 illustrations, 1923. Edinburgh: E. & S. Livingstone. Price 12s. 6d. net.

This is one of a series of handbooks on various subjects. It deals with the more important aspects of surgery and is of necessity somewhat domestic in its outlook. But there are important omissions. For instance, the various filarial surgical conditions, which affect millions of the world's inhabitants, should surely be worthy of some reference even in a handbook.

There is a great deal of general information compressed into a small space and the illustrations are numerous. The book will be a popular one among students preparing for examination.

HANDBOOK OF ANAESTHETICS.—By J. Stuart Ross, M.B., Ch.B., F.R.C.S.E., Lecturer in Practical Anaesthetics, University of Edinburgh. Hon. Anaesthetist, Edinburgh Dental School. With an Introduction by H. Alexis Thomson, C.M.G., M.D., F.R.C.S.E., and chapters upon Local and Spinal Anaesthesia by W. Quarry Wood, M.D., F.R.C.S.E., and upon Intratracheal Anaesthesia by H. Torrance Thomson, M.D. Second Edition. Pp. 328. Edinburgh: E. & S. Livingstone, 1923. Price 8s.

In spite of its modest appearance this little book contains a very complete account of the science of anæsthesia. The thin paper on which it is printed allows of the inclusion of many more pages than one would expect it to contain. The opening chapters deal with the action of anæsthetic drugs, modern theories of shock and its prevention and treatment, asphyxia, the causes of obstruction of the airway and its treatment. The views expressed are thoroughly sound and study of these chapters will supply the student with the key to most of his difficulties in administration. After dealing with the clinical phenomena of anæsthesia and the preparation of the patient, the administration of the various agents is taken up seriatim. Figures of modern apparatus are given in sufficient numbers and the directions are clear, precise and practical. Open ether appears to be the method of choice even in Edinburgh, but for use in India an apparatus such as the Pinson ether bomb, designed to supply a warmed ether vapour under pressure would appear to have the advantages of simplicity, safety and economy. The accidents and sequelæ of anæsthesia are adequately dealt with and we note an interesting suggestion of the author's as to the possibility of the use of insulin in post-anæsthetic acidosis.

The account of regional anæsthesia is rather too ambitious for a book of this size and suffers from lack of illustrations. The surgeon wishing to practise this method would be well advised to consult one of the special text-books on the subject.

We can cordially recommend this book as a sound practical guide to students and practitioners.

HERNIA; ITS ANATOMY, ETIOLOGY, SYMPTOMS, DIAGNOSIS, DIFFERENTIAL DIAGNOSIS, PROGNOSIS AND OPERATIVE TREATMENT. By Leigh F. Watson, M.D., Associate in Surgery, Rush Medical College, Chicago, Ill. St. Louis; C.V. Mosby Co. 1924. Price $ 11.00. Pp. 660.

This book, published by C. V. Mosby Company, St. Louis, at $11.00, contains 232 excellent illustrations by W. C. Shepard, is well bound, of handy size, and the printing is in large good type.

At the outset one can truthfully say that no pains have been spared to make this book a veritable mine of information on the subject of hernia.

The book commences with a very interesting historical introduction, a departure we particularly welcome and which we would like to see more generally adopted.

Every type of hernia is logically treated according to a definite plan of anatomy, etiology, symptoms, diagnosis, differential diagnosis, prognosis and treatment, with a complete bibliography at the end of every chapter.

The anatomy of each type of hernia is very clearly described in the old terminology, and illustrated with excellent diagrams, thus making it unnecessary to refer to anatomical text-books.

The commoner forms of hernia, viz., inguinal, femoral, and umbilical are exhaustively dealt with.

Particularly valuable, even to the experienced surgeon, are the chapters which describe the appearance of the bladder and large intestine in the hernial sac.

The author devotes a special chapter to local anæsthesia, with definite instructions as to the preparation of the anæsthetic agent, and the technique is described in full in the sections dealing with operations.

He stresses the importance of local anæsthesia in strangulated hernia, and is of opinion that the mortality is

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lowered by its adoption, which we venture to state should be more generally appreciated and acted upon by the profession. Where general excellence is so marked a feature, we can confidently recommend this book to all those interested in the subject of hernia.

A PRACTICAL TEXT-BOOK OF INFECTION, IMMUNITY, AND BIOLOGIC THERAPY. By Johan A. Kolmer, M.D., D.P.H., D.Sc. (Hon.), Professor of Pathology and Bacteriology in the Graduate School of Medicine, University of Pennsylvania, Philadelphia and London: W. B. Saunders Co., 1923, 3rd Edition. 1210 pp., 202 illustrations, including 51 in colours. Price 60s. net.

This well-known and monumental work has run through three editions and two additional reprints since it first appeared in 1915. It is now a very large volume, replete with profuse illustrations, many of them beautiful full page colour plates. To say that the book is a necessity to every laboratory worker is but to mention one aspect of its many-sidedness; it will also be of very great value to the practising physician, for in hardly any other book that we know of is there so thorough and so profusely illustrated an account of such procedures as lumbar puncture, collection of specimens, methods of immunisation with sera and vaccines, allergic reactions, and—in general—the technique of immunisation methods. The book aims at three main purposes:—

"1. To give to practitioners and students of medicine a connected and concise account of our present knowledge regarding the manner in which the body may become infected, and the method in turn by which the organism protects itself against infection, or strives to overcome the infection if it should occur, and also to present a practical application of this knowledge to the diagnosis, prevention and treatment of disease.

2. To give to physicians engaged in laboratory work and special workers in this field a book to serve as a guide to the various immunological methods.

3. To outline a laboratory course in experimental infection and immunity for students of medicine and those especially interested in these branches."

To say that the book thoroughly fulfils these purposes is to do it insufficient justice. It is a monument of expert knowledge, ability and usefulness; in fact it should be the *vade mecum* of every worker who has much to do with laboratory work. The chapters deal in turn with general technique, obtaining animal and human bloods, animal inoculation technique, methods of preserving sera; the principles of infection and immunity,—a thoroughly well written section; antigens, antibodies, opsonins, antitoxins, ferments and anti-ferments, hæmagglutinins, precipitins, cytolysins, bacteriolysins, hæmolysins and venom hæmolysis. Then comes a very full and detailed section, with numerous full page colour plates, on complement-fixation methods;—where the whole subject of the Wassermann reaction is gone into very thoroughly,—the author's four methods, the first a simple technique for inexperienced workers, the second in which three antigens are used, the third the result of six years of intensive study, and the fourth where different amounts of complement are used with a constant amount of antigen, are all first described in detail,—followed by sections on the American Hygienic Laboratory method, the Noguchi method, Craig's modification, and the Hecht-Weinberg-Gradwohl method. This is followed by a full discussion on the clinical significance and interpretation of the Wassermann reaction and by a detailed chapter on precipitation methods reaction in syphilis.

In the section on clinical allergy and biologic therapy, the Schick test is very fully considered, also vaccines, sera, vaccination, non-specific protein therapy, the biologic therapy of tuberculosis, and blood transfusion. Finally a laboratory course in experimental infection and immunity is outlined.

In this edition there is much that is new. The chapters on precipitins, agglutinins and complement fixation have been entirely revised. New chapters have been added on hæmagglutinins—with special reference to blood transfusion,—and upon serum reactions in syphilis other than complement fixation reactions. The chapters on anaphylaxis, allergy and hypersensitiveness have been almost entirely re-written, and new chapters included on allergy in relation to infection and immunity, clinical allergy, allergic skin reactions, and the Schick test. Many other additions call for attention such as the one on blood transfusion. The subject of chemotherapy has been omitted from this edition, as it is to be re-written as a separate monograph.

The splendid colour plates throughout the volume are of very great value and beautifully executed, the colour plates of the Schick test, tuberculin tests, vaccinia, pollen tests and local serum anaphylaxis being very striking.

There can be no question of the extreme value of this well-known book to both laboratory workers and physicians, and the present edition is a great improvement even upon the excellent quality of the older second edition.

VEGETABLE DRUGS OF INDIA. By Devaprasad Sanyal, L.M. & S. (Cal.) Published by the author, 13, Radha Nath Bose Lane, Calcutta. 397 pp. Price Rs. 3-8-0.

This is a most useful little book whose publication we would especially welcome. India is particularly rich in medicinal plants, some she even supplies to other countries, yet almost the whole of her drug requirements is annually imported from outside. If proper medical attendance is ever to become available for all classes of Indians, the gradual building up of an indigenous pharmacopœia is essential; many of the official drugs could easily be prepared in this country, others are proved efficient substitutes for drugs with similar properties now imported into India, still others are popular remedies, the true value of which remains to be investigated; and the first step towards the building up of such an indigenous pharmacopœia is knowledge as to the medicinal plants indigenous in India. There are already several large works on the subject, but most of them—such as Dymock's "*Pharmacographica Indica*"—are now very old and out of date.

The book will accordingly be found useful by several different classes of readers; by the indigenous practitioner, the chemist, and the pharmacological investigator. The author writes in his preface that it has taken him years of hard work to bring out this book, but the result is very good; the arrangement is good; it is well written, and well indexed. In one matter, however, we confess to disappointment with it; that so much recent work, e.g., that of Chopra on *purnanarva* and *arjun*, and the use of *bouchi* in leucoderma, also the reports of the Indigenous Drugs' Commission, has been omitted. As far as it goes the book is excellent, but if a second edition is called for,—as we hope will soon be the case,—the author would do well to go through the Indian medical journals of the last ten years and bring his information more up to date. It is all very well to rely on the *Sanhitas* of Charaka and Susruta, but to do so does not advance Indian pharmacology, a science which is at present *in embryo*. What is required is exact investigation of the chemical constitution and properties of the different plants and to isolate their active principles for experimental test. Only in such a way can what is really useful be distinguished from what is useless, and an indigenous pharmacopœia of real value be built up. It Indian medicine is to advance as an indigenous art and science, it must be by the application of the exact methods of test and investigation of modern international scientific medicine, as applied to the special problems and needs of India.

Having said so much by way of criticism, however, we have for the rest nothing but praise for the book. It supplies a real want, the need for some handy and convenient work of reference on this important subject, at a cheap price.

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THE SCIENTIFIC AND OTHER PAPERS OF RAI CHUNILAL BOSE BAHADUR, C.I.E., I.S.O., M.B., F.C.S., VOL. I. Edited by J. P. Bose, M.B., F.C.S., Mitra Research Scholar, Calcutta School of Tropical Medicine. 523 pp. Calcutta, 1924. Price Rs. 5.

We must congratulate Dr. J. P. Bose on the publication of this book, for not only is its production a filial duty well carried out, but it contains a wealth of interesting and valuable information, especially with regard to medico-legal matters in India.

Rai Chunilal Bose Bahadur is one of the most distinguished of the alumni of the Calcutta University. Born in 1861, he qualified in 1886, and from that year onwards was closely associated with the Chemical Examiner's Department at the Medical College Hospital, Calcutta. During his 34 years of government service, Dr. Bose acted as Chemical Examiner and Professor of Chemistry no less than 13 times, and held this important post continuously at one period for six years. His great abilities, his erudition and his exceptional keenness were rewarded by Government with the bestowal of different decorations, culminating in the well earned award of the C.I.E. Dr. Bose is well known to several generations of I. M. S. officers, to a host of friends in Calcutta, at the Calcutta Medical College and in the Calcutta University. Only recently he held the high office of Sheriff of Calcutta at the time of the visit of the Duke of Connaught to India in 1921; whilst his public and social activities are well known.

In the course of his long and distinguished career, Dr. Bose has made several notable contributions to medical literature, especially to chemical, pharmacological, and medico-legal literature; and these papers are republished in this volume, which is the first of two to be issued. Many of the papers are of great interest, and are reprinted from the *British Medical Journal*, the *Indian Medical Gazette*, the *Calcutta Medical Journal*, and the *Transactions of the Chemical Society of London*. They will be found of interest, not only to the medico-legal worker,—to whom this volume will especially appeal,—but also to the general medical reader. There is a wealth of carefully collected and observed facts in the book, an account of much original research work, and above all, medico-legal case histories, notes and information of the greatest value to civil surgeons and medico-legal workers in India.

The book contains an admirable portrait of the distinguished author whose papers are here presented in collected form, and we trust that it will have a wide circle of readers.

VENEREAL DISEASE. ITS PREVENTION, SYMPTOMS AND TREATMENT. By H. W. Bayly, M.C., Pathologist to the London Lock Hospitals. 2nd Edition, 1924, London: William Heinemann. Obtainable from Messrs. Butterworth & Co. (India)., P.O. Box 251, Calcutta. 176 Pp. 58 Illustrations. Price Rs. 5-10.

This is a book for the general practitioner, and an admirable one at that. The author is not only pathologist to the London Lock Hospitals, but also in charge of the venereal department at St. George's Hospital, and of the venereal blocks at the Rochester Row and Grove Military Hospitals. The book is therefore authoritative, whilst it is also very instructive and its price is cheap.

The book opens with controversial matter. The author is honorary secretary to the Society for the Prevention of Venereal Disease, which he launched in 1919 and of which he is a very active member. This Society strongly advocates the diffusion of knowledge concerning self-disinfection and the sale of such disinfectants with full instructions to adults. The movement has aroused vigorous support, and among others Mr. Rudyard Kipling, Bishop Weldon, Mr. H. G. Wells, Sir Archdall Reid, the *Morning Post* and the *Times* (whilst under Lord Northcliffe's control) have supported it. On the other hand this policy has been fiercely attacked by Lord Astor and was opposed by the National Council for Combating Venereal Disease. In June 1923 the Committee of Inquiry on Venereal Disease, appointed by Government and under the presidency of Lord Trevethin issued their report, a report accepted by both parties to the controversy. In August 1923 the two societies met in conference, and took steps towards a fusion of the two societies. *Inter alia*, a resolution was passed advocating that chemists should be permitted to sell *ad hoc* disinfectants, if issued in an approved form and with instructions for use approved of by competent authority. The controversy, which has been vigorously waged for some years in the columns of the British medical press, is therefore now settled; and in his preface the author gives a brief account of the controversy; and in his first chapter details for such early self-disinfection are fully set out, together with notes on diagnosis.

We think that most—or all—medical officers with war experience will agree with the author. Self-disinfection, if properly carried out and immediately after connection, —or even before—is a measure which has repeatedly proved its great value in lessening the incidence of venereal disease among troops. Its failure is usually due to either carelessness or drunkenness on the part of the user. The provision of disinfecting stations for the public, where skilled operators would apply the treatment to all and sundry, is beyond the range of practical politics. The venereal disease problem is a very serious one for every country in the world, and—however deplorable be the admission,—it will not be lessened by moral lectures. The author does not go as far as a recent writer in the medical press, who advocates that after 6 p.m. policemen should be empowered to demand from any one suspected to be a bachelor, production of his "prophylactic packet," under penalty of imprisonment if he fails to produce it; but he is an advocate of the instruction of all male adults over 18 years of age, and of such adult women as desire instruction. The Trevethin Committee having reported favourably on self-disinfection, it will be interesting to see the results in future years on venereal statistics for the British Isles.

With regard to syphilis, the author gives first a clear and well written account of clinical symptoms and diagnosis. He comments on vesicular and pustular syphilides as rare, but in this matter we do not think that Indian experience will agree with him; such syphilides are far from uncommon in this country. Fournier, in a series of over 4,000 cases of syphilis, records the nervous system as involved in over 40 per cent., the skin in 33 per cent., and the bones in 15 per cent. Excluding the nervous system, however, the skin is attacked by tertiary syphilis nearly as often as all other regions put together. A full account of syphilis of the nervous system is followed by an excellent one on the signs and symptoms of congenital syphilis. About 80 per cent. of fœtal or infantile syphilis occurs within the first five years of parental infection. In delayed congenital syphilis the 12th year of life is the critical one; the lesions are of tertiary type and are often mistakenly diagnosed. (In India, we may add *acquired* syphilis in early life and even in infancy, is not at all uncommon, the result of practices which need not be mentioned; in fact a case recently seen by the reviewer was that of a male child only 18 months of age with a primary chancre full of *S. pallida* on the anus.)

Chapter 6 deals with pathological diagnosis. The account of *S. pallida* as seen under the dark ground is very good; it is written from life and not copied from a text-book; indeed one of the best features of this book throughout is that it is written from so wide a clinical experience; the author has given what he knows as the result of long experience and not a mere compend from larger text-books. Distilled water is the best medium in which to examine for the spirochæte, whilst its movements last longer in the patient's serum than in any other medium.

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Particularly valuable are the author's comments on the value of the Wassermann reaction; "the Wassermann reaction is not in any sense an immunity reaction; it is neither a test for toxin nor antitoxin, but is only a remote consequence of syphilitic infection..... After years of trial the medical profession have to a large extent accepted the dogma that a positive Wassermann reaction is a proof of syphilitic infection. Such blind faith in this test is not justified, and will occasionally lead to serious error..... That a positive Wassermann reaction is a symptom of great value and assistance in the diagnosis of syphilis I have always believed, and still believe, but I do not think that a diagnosis of syphilis can be based on this test alone, unsupported by either history, symptoms or the rapid improvement of doubtful cases under anti-syphilitic treatment..... The reaction is of great value in obstetric practice as a means of diagnosing latent syphilis in the mother.....a positive Wassermann reaction of the cerebro-spinal fluid indicates that the patient either has general paralysis, tabes or cerebral syphilis."

Turning to treatment, the author prefers novarsenobillon, used in a dilution of 0.1 gramme to 1 c.c.; but he fully discusses different treatments advocated, with sections on mercurial and bismuth preparations. Kolle of Frankfort is quoted as claiming that ten doses of silver salvarsan will cure a case with no administration of mercury at all, and Fourneau and Fournier as claiming that stovarsol is not only an efficient cure which can be administered subcutaneously, but that it is a valuable abortive when taken orally within a few hours of exposure to infection. The author's picture of a large necrotic ulcer of the arm at the site of a faulty injection of N.A.B. is one which we should like to see framed and hung up on the walls of many Indian dispensaries as an example of how not to do it. (Anyone may be excused for missing a rather difficult vein; there is no excuse at all for injecting a violently irritant solution when the operator is not satisfied that the needle is really within the lumen of the vein. Stop, and try another vein is the only permissible rule.) Particularly useful is the author's chapter 8, on intolerance to and complications of treatment.

The section dealing with gonorrhœa follows the same general scheme as that dealing with syphilis. Very striking are figures 28 and 29, shewing the *cul-de-sacs* in the male and female, infection of which means an intractable condition very difficult to completely cure. A chapter on the clinical diagnosis of the acute condition is followed by a very well written one on chronic, latent gonorrhœa and its complications. Under treatment, the abortive treatments are first described; here the author first seals in half a drachm of colloidal silver, 1 in 2,000, twice in the first 24 hours, using a special clamp for the purpose, followed by three days of anterior urethral irrigation with two pints of 1 in 2,000 potassium permanganate. Under treatment of acute and chronic gonorrhœa, the full technique for anterior and posterior urethral irrigations is given; also methods of strapping in epididymitis, accompanied by illustrations.

Turning to chronic gonorrhœa, he advocates posterior urethrovesical irrigation, instillation of silver nitrate with Ultzmann's syringe and catheter once a week, ionisation of the urethra, massage of the glands connected with the urethra, dilatation of the urethra and destruction of foci in and around the urethral wall by cauterisation or incision. The use of the urethroscope he does not describe; the book is written for the general practitioner, he states, and the general practitioner has scarcely the skill necessary to use the instrument. (On the contrary we consider such a statement rather disappointing, since the instrument is almost invaluable in the treatment of chronic infections.)

Chapter 13 deals with the treatment of gonorrhœa in the female, and here the treatment advocated is combined consulting room and home treatment. The author perhaps hardly lays enough stress upon the necessity for dealing with the cervical canal, which is usually perhaps the site of infection in chronic cases. Section IV of the book deals with non-specific lesions, and section V with the patient, methods of examination, the taking of specimens, venereal diseases and marriage.

The illustrations in the book might perhaps be improved upon, but they are numerous and helpful. The whole book is exactly what the general practitioner needs; a thorough exposition of the subject, written from the standpoint of wide experience and authority, and full of original matter.

R. K.

MENTAL DISEASES.—By R. H. Cole, M.D. (Lond.), F.R.C.P. Third Edition. London University of London Press Ltd., 1924, Pp. 356. Price 15s. net.

This text-book of psychiatry for medical students and practitioners has reached its third edition, being largely rewritten, brought up to date, and is well up to the standard of its former editions. It gives a useful review of the subject of psychiatry in all its branches. The medico-legal chapter, however, though all that is required by practitioners in England, is useless to Indian practitioners, owing to the differences in the laws and administration of the two countries.

Chapter I gives a brief résumé of the incidence and history of insanity in England. The next four chapters deal in an elementary fashion with psychological processes. Thereafter insanity itself is dealt with both generally and in detail.

It is, as already said, an up to date, readable book containing much of interest and use to the general practitioner, its only drawback for the practitioner in India being that already noted.

It contains 54 excellent illustrations which add to the effectiveness of the book, though it is doubtful if the extra cost entailed by their introduction is warranted by any corresponding gain in utility.

CRIME AND INSANITY.—By W. C. Sullivan, M.D. London: Edward Arnold & Co., 1924. Pp. 259. Price 12s 6d. net.

Dr. Sullivan's book is a notable and authoritative addition to the literature on morbid crime, and it has appeared at a time when,—owing to the proposed changes in the Lunacy Laws of Great Britain as a result of the Atkin Committee—guidance on such matters is particularly welcome.

As Medical Superintendent of Broadmoor he has had a wide experience of criminal lunatics, and he illustrates his argument with a wealth of examples which have come under his own observation.

The aim of his work is, in his own words, "to consider, from the standpoint of clinical experience, the nature and extent of the influence of psycho-pathological conditions in the causation of those disorders of social conduct which come within the purview of the criminal law." These considerations fall naturally into three sections:—

(1) the bio-social problem and psychological classification of crime as a whole;

(2) a description of the types of crime associated with the different varieties of mental disorder; and

(3) a discussion of the legal and the psychiatric points of view, both as regards the responsibility for crime and the principles on which we should attempt to reform our existing lunacy laws.

In his conclusions, he advocates the adoption of a simpler test of "responsibility"; the admission of a *qualified* responsibility in cases where the offenders, though not certifiably insane, are abnormal to an advanced degree; and lastly, "the establishment of a system for providing the court with full, impartial and authoritative expert evidence as to the mental state of the accused person." With the last reform, especially, we most emphatically agree.

In his preface, Dr. Sullivan states that, though his book has been primarily written for students of psychiatry, medical men and lawyers, he has endeavoured to

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——— *The Lancet, 1923, 1., 696.*

[1] Now known by the convenient name "Dimol." [2] *The Lancet*, 1921, i, 758.

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treat the subject "in a manner that may make the book suitable also to the general reader." This being so, it seems a pity that he should have indulged so often in a plethora of long and technical words. This is a pitfall into which too many medical writers fall. To take an instance at random; we read about dementia præcox (p. 101), "Mott has shown that this primary degenerative insanity is constantly related to pathological changes in the latest developed layers of the cerebral cortex, indicative of 'an inherent germinal narrow physiological margin of functional capacity of the brain,' by reason of which mental disorder is readily induced by stresses—physiological, psychological, and pathological—which would be borne with impunity by the normally constituted individual. The coincident regressive changes in the genital glands point to this cerebral degeneration being a manifestation of a general inborn deficiency of vital energy." In a mere "general reader," the reading of such sentences as the one quoted might, we fear, induce "mental disorder" quite apart from any pathological change in the cerebral cortex! Nevertheless, the whole book is well worth reading and studying, and its excellent print makes this the more easy of accomplishment.

Its application to crime and insanity in India is only general, but no medical man in this country could fail to benefit by a perusal of its pages, especially if read in conjunction with Colonel Jackson and Sir Walter Buchanan's "Minute to the Report of the Jail Commission." The book should certainly find a place, together with Hamblin Smith's "The Psychology of the Criminal," in the libraries of all medical superintendents of jails and asylums in India.

F. A. BARKER.

INSANITY IN EVERY-DAY PRACTICE.—By E.G. Younger, M.D. Brux. 5th edition, revised and edited by G.W. Smith, O.B.E., M.B. London: Baillière, Tindall & Cox, 1924. Pp. x and 134. Price 5s. net.

THE fact of such a book reaching its 5th edition, speaks for itself and renders the work of the reviewer almost superfluous. The edition under review is well up to the standard of the previous ones and likely to prove a very handy book for pocket reference to the practitioner in England. For the practitioner in India its use is however greatly restricted by the difference in the laws of the two countries regarding lunatics. This fact renders it of little use to the general practitioner in India, whose purposes will be much better served by a book written expressly for India and containing the laws, rules and regulations of that country instead of those of England.

For the rest, various types of insanity are briefly described and the examination of the patient and certification gone into fairly fully. The text is up to date on the whole, but one is left with an unsatisfied desire to hear more of the endocrine glands in relation to insanity, though perhaps excursions into such issues would be extraneous to the purpose of the book and render it too large and unwieldy.

As we have already noted, it undoubtedly serves its purpose admirably for the practitioner in England, but it is scarcely to be recommended in India owing to the difference in the laws of the two countries.

A. W. OVERBECK-WRIGHT.

PRURITUS OF THE PERINEUM.—By Joseph Franklin Montague, M.D., of the Rectal Clinic University and Bellevue Hospital, Medical College, New York. New York: Paul B. Hoeber, 1923. Pp. 186, with 37 Illustrations. Price $3·50 net.

THIS book is a careful study of pruritus of the anus, scrotum and vulva, one of the most harassing of diseases for the sufferer and one which often tries the therapeutic skill of his medical adviser to the utmost. The opening sections deal with the ætiology and histology of the condition and are illustrated by numerous micro-photographs. The author has investigated the bacteriology of 34 cases of ano-rectal disease, in 14 of which pruritus was present, and compared them with 5 normal persons. His results were essentially identical in each group and did not confirm the theory of causation of the condition by streptococcus fæcalis advanced by some workers.

His clinical division of the condition into direct and indirect cases, i.e., those having some local pathological condition present, apart from the results of scratching, and cases not presenting such condition, is attractive, but is not in accordance with current views, most writers inclining to the belief that a local pathological condition is usually present. In the chapter on examination the details of the procto-sigmoidoscopic examination are omitted, but it is surely by this method of examination that the causation of obscure cases is likely to be detected.

The chapters on treatment are the best in the book and the reader will find here a most useful collection of formulæ, arranged in accordance with the skin lesion present, a point which we have not observed in any other book. The value of X-Rays, ionic medication, vaccines and surgery are duly appraised and we learn that, like most rectal specialists, the author has invented a modification of Ball's operation.

Altogether this is a most useful book which we can recommend to practitioners and specialists.

Annual Report.

TRIENNIAL REPORT ON THE HOSPITALS AND DISPENSARIES UNDER THE GOVERNMENT OF BENGAL FOR THE YEARS 1920, 1921 AND 1922. CALCUTTA: BENGAL SECRETARIAT BOOK DEPOT. PRICE Rs. 8-8.

THIS report,—which is by Lieutenant-Colonel A. B. Fry, C.I.E., D.S.O., I.M.S., Officiating Surgeon-General, during the absence on leave of Major-General B. H. Deare, C.I.E., I.M.S.,—gives ample evidence of real progress in medical matters in the department. With the introduction of the Reforms Scheme, the Department was placed under the Minister in charge of Local Self-Government, aided by a standing committee of the Surgeon-General and four non-official members.

The triennium opened with an outlook anything but promising; 132 medical officers belonging to the province were still absent on military duty; the prices of foodstuffs were very high; the medical services were full of discontent at entirely inadequate rates of pay, whilst the aftermath of the influenza pandemic was still everywhere felt. The end of the triennium, however, saw a marked improvement in every one of these respects. The medical officers gradually reverted to civil duty, thus relieving the tremendous strain on the very much depleted staff who had carried on during the war years; rates of pay were increased for all the medical services; epidemics resumed their ordinary degrees of severity, and prices fell somewhat. In fact 1922 was one of the healthiest years recorded in Bengal.

The triennium was a period of severe financial difficulties. Money was not forthcoming, and many schemes of considerable moment, adumbrated in former years, had to be either abandoned or else put off indefinitely. Yet there were several notable events; the Calcutta School of Tropical Medicine and Hygiene with its attached Carmichael Hospital for Tropical Diseases was opened; a new medical school was established at Dacca, a scheme for the establishment of another at Mymensingh has matured, a programme for the establishment of many more has been mapped out.

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With regard to personnel, there were heavy losses by death and retirement among I.M.S. officers. The Department suffered a great loss by the sudden and tragic death of Major-General W. H. B. Robinson, C.B., K.H.S., I.M.S., on the 7th February, 1922, also in the death of Lieutenant-Colonel W. D. Sutherland, I.M.S., the distinguished serologist, and further loss in the death of Major S. C. Pal, I.M.S.; whilst 7 other I.M.S. officers retired. In all the department lost 16 officers by death and 48 by retirement.

The office of Surgeon-General was held consecutively during the triennium by Major-General W. H. B. Robinson, Lieutenant-Colonel F. O'Kinealy (officiating), Major-General B. H. Deare, and in an officiating capacity by Lieutenant-Colonel R. F. Wilson and Lieutenant-Colonel A. B. Fry.

With regard to pay, the pay of I.M.S. officers was increased in December 1918, and again in March 1921 with retrospective effect. That of military assistant surgeons was increased in April 1920, also of civil assistant surgeons in the same month. The pay of sub-assistant surgeons was increased in December 1921, of ministerial officers in January 1922, and that of menials in August 1921. Only the unlucky compounders, whose present 1919 scale of pay is admittedly inadequate, escaped the general improvement, owing to financial stress. It is hoped that government will soon be in a position to consider the subject.

In the sphere of medical education and research, the Calcutta School of Tropical Medicine and Hygiene was opened in November 1921, the formal ceremony being performed later in February 1922 by Lord Ronaldshay. Readers of the *Gazette* will have had ample opportunity to judge for themselves of the value of the School in the numerous articles contributed by its staff to our columns. There is a very keen competition for admission to the long term six months class which terminates with the examination for the Diploma in Tropical Medicine of the newly created Faculty of Tropical Medicine, Bengal. This examination perhaps ranks first among diplomas in tropical medicine in the world. The subjects included are tropical medicine and surgery, hygiene, bacteriology and pathology, helminthology, protozoology, entomology, pharmacology, and serology. In addition to teaching in such subjects there is special tuition by the whole time research workers in kala-azar, leprosy, dysentery, diabetes, and filariasis, whilst the clinical material for instruction is unlimited, and probably not equalled in any other city in the tropics. The examination subjects are divided into three groups, and to pass a candidate has to secure 50 per cent. in the combined paper in each group, and 50 per cent. in the five practical examinations. The standard set, in fact, is a selective one and it is ruthlessly adhered to. For distinction a total of 75 per cent. is required in addition to the qualifications for a pass, and the severity of the examination may be judged by the fact that—although three examinations have been held up to the date of writing—only one student has been awarded distinction. Thus—thanks to the splendid efforts of Sir Leonard Rogers, the generosity of the English and Indian commerical community, and the support of the Imperial and Bengal Governments,—apart altogether from its value as a centre of medical research—there comes into existence in India a post-graduate medical diploma which is a guarantee of efficiency. If we may be permitted the comparison, the D.T.M. (Bengal) stands to medicine in India generally in much the same relationship as does the English F.R.C.S. to British surgery.

On the other hand much less advantage has been taken of the short term three months classes. In this matter the profession in India seems to have made a mistake. The short term class is *not* intended merely for selected sub-assistant surgeons; it is an admirable course for the medical practitioner or laboratory worker who cannot afford the time to attend the six months course. The short term class has unfortunately been badly attended; and its value has still to be recognised by the profession in India.

Given thus a sort of G.H.Q., with an intensive course of instruction and a final and searching examination as a test of efficiency, by degrees the Calcutta School of Tropical Medicine, it is hoped, will turn out an increasing number of medical men trained and suitable for the teaching of medical undergraduates. The most crying need of the day in medical matters,—in Bengal as elsewhere in India,—is for the supply especially in the *mofussil*, of well trained and intelligent sub-assistant surgeons. Here steps are in hand to improve the position in Bengal. During the triennium the sanctioned strength of students at the Campbell and Dacca Medical Schools was raised to 500 and 400 respectively. The new Ronaldshay Medical School—with accommodation for 200 stduents—was opened in July 1921. These three institutions are capable of turning out approximately 200 sub-assistant surgeons a year; but even so, the supply will still be inadequate, and in March 1921 government accorded sanction to the establishment of a fourth medical school at Mymensingh at an estimated course cost of Rs. 96,600. This school should be ready to open in 1924.

Further efforts will be directed towards providing a cheaper type of medical school at centres with large hospitals, and the establishment of such schools at Chittagong, Berhampore and Jalpaiguri is contemplated. It will be seen therefore that the triennium saw very important advances in both medical education and medical research work.

Of other various schemes on foot, the system of appointing non-service medical men to the house appointments at the Calcutta Medical College Hospitals is reported to have proved unsatisfactory, and the 8 senior such appointments have again been thrown open to civil assistant surgeons. The King Edward Memorial Fund allotted a sum of 2½ lakhs in government 3½ per cent. paper for the establishment of a special leper institute at the Calcutta School of Tropical Medicine. This scheme—originally meant as a small, independent building,—has now enlarged into the construction of a new wing, built upon the School grounds with accommodation for a self-contained and segregated leper institute section on one floor; a Pasteur Institute for Bengal on another floor; a museum and additional laboratories on a third floor; and will considerably increase the ever-widening activities of the School. Sums were also allotted from the same Fund for the Mymensingh Medical School and for the construction of a new hospital block at the Carmichael Medical College.

In March 1920 a proposal was put forward to introduce a qualifying examination for nurses in Bengal and to standardise their training and examination on the lines adopted in the United Provinces. The scheme was finally sanctioned by Government in February 1922 and the State Medical Faculty of Bengal has now introduced such courses and examinations and commenced a register of duly qualified nurses and midwives. Indian nurses are trained under the auspices of the Lady Carmichael Scheme at the Sambhu Nath Pandit Hospital, Calcutta, the Eden Hospital, Calcutta and the Mitford Hospital, Dacca. In July 1922 a committee was appointed by Government to consider the feasibility of training Hindu ladies as nurses, but this scheme fell through, as no candidates were willing to take up nursing as a profession.

The Lady Minto Electrical Annexe at the Calcutta Medical College Hospitals has been called upon to do an ever increasing volume of work, the total number of cases dealt with having risen from 3,167 in 1920 to 4,627 in 1922. Considerable difficulty was experienced in securing regular supplies of apparatus and plates. In connection with the Serological Department there has been a change of procedure; and suspected blood stains are in the first instance sent to the Chemical Examiner, who examines them to determine whether blood is or is not present. Only if blood be detected

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is the specimen now sent on to the Imperial Serologist for examination as to whether the blood is human or not.

In accordance with the recommendations of the Medical Services' Committee, a scheme for the post-graduate training of civil assistant surgeons,—in place of the previously existing septennial promotion examinations—was introduced.

Calcutta Hospitals and Dispensaries.

There were 23 hospitals and dispensaries in Calcutta during the triennium under review, and a total of 1,366,097 patients were treated. The facts that epidemic influenza continued unabated until the middle of 1920 and that cholera was endemic throughout 1921 are largely responsible for this very big total. The total number of in-patients treated in the triennium was 123,059; but there was a marked falling off in 1922, as the year was an exceptionally healthy one. The mortality rates in hospital in-patients steadily declined, from 15 per cent. in 1920 to 11.94 per cent. in 1922.

The Calcutta hospitals were in general brought to a more up-to-date footing. In this connection special mention may be made of the extension of the Elliott Ward of the Carmichael Hospital and of the construction at the Medical College Hospitals of a Nurses' Home at a cost of 6½ lakhs.

At the Medical College Hospitals the cholera ward was closed down in 1920 and re-converted into a septic ward for the Eden Hospital; the project for an extension to the Eden Hospital giving 52 extra beds, and a new extra maternity department which will very greatly improve the teaching of midwifery was held up for want of funds, but the latter half of the scheme is being proceeded with. At the Campbell Hospital the additional Connaught Wards, together with the Fraser and Elliott Wards, now together make up a surgical hospital which compares favourably with any other in the city. The special eye, nose and throat department is making very great strides; there is never a bed vacant.

The attendance at the Presidency General Hospital during the triennium was more or less steady. There has been a steady increase in the number of patients in the Woodburn Ward,—from 379 in 1920 to 530 in 1922. A whole time anæsthetist has been appointed and a second pathologist. The Sambhu Nath Pandit Hospital records a steady increase in out-patient work. It stands badly in need of an X-ray apparatus, but funds are not likely to be forthcoming. At the Carmichael Medical College the new surgical hospital was completed and opened in 1922.

The staff of nurses attached to the Calcutta hospitals was increased from 346 to 422. A most interesting table shews the average number of patients per nurse; this varies from 2.39 patients per nurse at the Presidency General Hospital to 31 patients per nurse at the Carmichael Hospital for Tropical Diseases,—(where no surgical work is undertaken). The finances of the Calcutta Hospital Nurses' Institution being in a very bad way a committee was appointed to go into the matter. According to the recommendations of this committee, Government agreed to the levying of increased charges in the Presidency General and Medical College Hospitals of from 4 annas to Re. 1 per patient per day, the sums thus collected going to the Nurses' Institution.

With regard to diseases in Calcutta, the tremendous increase in kala-azar at once arrests attention; the figure for 1922,—2,940 cases,—being actually greater than the total for the triennium 1914–16. This does not mean, however, that the disease is seriously spreading in the city; it is mainly attributable to the opening of the kala-azar research department at the Calcutta School of Tropical Medicine, and to improved facilities in diagnosis and treatment. The Carmichael Hospital for Tropical Diseases, which opened in December 1921, treated 234 cases of kala-azar in that month alone. Influenza was prominent at the beginning of the triennium, but gradually waned. The cholera outbreak of 1922 was a mild one, the mortality from cholera in the city being the lowest on record since 1918. The small-pox epidemic of 1920 threw a heavy strain upon the Campbell Hospital; temporary accommodation for 100 extra patients had to be run up, and in all 1,346 cases were treated in the Calcutta hospitals. The 1922 outbreak was of a mild and localised character.

Tuberculosis being one of the scourges of Calcutta city, special measures have been taken of recent years to attempt to cope with at least a part of its problems; but unfortunately financial stress prevented the opening of the special tuberculosis ward constructed as a memorial to the late Lieutenant-Colonel H. W. Pilgrim, I.M.S., at the Presidency General Hospital. The special tuberculosis ward on the roof of the Medical College Hospital treats a small number of cases annually,—127 in 1922,—but as yet there is nothing like the provision that there should be in Calcutta for the treatment of what is one of the most prevalent diseases in the city.

The total number of surgical operations performed during the period was 136,827,—an increase of 6,959 on the previous triennium. In the Medical College Hospitals no less than 47,470 were performed. Intravenous injections, spleen punctures, hypodermic injections, etc., which were formerly classified as "surgical operations" have now been wisely considered not to be such; (indeed if they were, the Calcutta School of Tropical Medicine—which does no surgical work—might possibly head the list!). Among selected operations, cataract cases numbered 3,620,—Colonel Coppinger having performed 2,734 at the Medical College and Mayo Hospitals in a little over two years; Major K. K. Chatterji heads the general operation list with 1,897 operations in the three years, an experience which probably leaves many surgeons at Home well behind The operation lists indeed shew how enormous is the field for experience in the big presidency cities of India.

The total income of classes I, III and IV institutions amounted to Rs. 87,72,883 in the triennium, of which Government found almost 70 per cent. Rs. 56,04,755 of this was expended on upkeep, the balance as grants in aid to local fund and private aided institutions. Of special donations a gift of Rs. 50,000 by Mr. W. S. J. Wilson of Messrs. Turner Morrison towards the Mayo Hospital, and of Rs. 10,000 from Mr. John Taylor, late of Messrs. Bird and Co., for the endowment of beds in the Howrah General Hospital, deserve mention. The total expenditure in the triennium was Rs. 86,14,712 on upkeep. The salaries of medical personnel cost Rs. 9,64,713 during the triennium, as against Rs. 6,98,134 in the previous triennium, partly owing to increase of staffs, chiefly owing to increased rates of pay. The invested capital of the different institutions at the end of the triennium amounted to Rs. 12,65,844.

District Hospitals and Dispensaries.

The triennium opened with 765 institutions and closed with 859, and Colonel Fry notes that if the progress of additional dispensaries continues at its present rate of 31 more per annum, it will take some seven years more to provide the minimum adequate medical relief to the population of Bengal. The newly opened dispensaries include 2 municipal, 59 district board, 18 private aided, 14 private non-aided, 9 railway and 3 union board dispensaries. Eleven dispensaries were closed. Burdwan secured 32 of the new dispensaries, Rajshahi 30, Dacca 21, the Presidency Division 13 and Chittagong 9. Twenty dispensaries were at work in connection with fairs and festivals. Four Ayurvedic and homeopathic dispensaries were opened during the triennium in accordance with the orders of Government, in Khulna, Tippera, and Faridpur, but very little information has come to hand of their success or otherwise.

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The quarterly inspection of outlying district dispensaries has always been a plague to every conscientious civil surgeon in India, and many of our readers must have spent innumerable days of useless and unproductive toil in such work. Such inspections may be useful and necessary, but they are often undertaken at the expense of far more important work. In 1923 the Surgeon-General reduced the number of such inspections per annum to 2 or 3 in the case of certain nominated dispensaries, in a few cases to only once a year. "For this relief, much thanks." Presumably dispensaries lying in the wilds must be inspected; but unless the inspection is of the nature of a surprise visit it is not of much use, whilst it wastes much of a civil surgeon's valuable time.

The mofussil institutions treated 21,845,791 patients during the triennium,—an increase of 1,666,594 over the previous triennium. In order of importance of diseases treated come malaria, respiratory diseases, diseases of the eye and ear, and intestinal disorders. In-patients totalled 204,408 as against 208,860 in the previous triennium. During 1920–1921 influenza and cholera were rife, but almost all districts report that 1922 was an exceptionally healthy year. More than one-third of the in-patients were treated at district headquarters. The Dacca Mitford Hospital treated about 4,000 in-patients a year, the Burdwan Fraser Hospital some 2,200 a year.

The most urgent medical problem in the mofussil hospitals is that of nursing. There is nothing new to be said with regard to existing conditions; "nursing" is usually carried out by the patients' relatives or by coolies. Here and there an institution employs one or two,—in the case of the Darjeeling Victoria Hospital as many as five,—nurses; sometimes a part-time nurse is available; at Krishnagar Sadar Hospital an Italian Sister of Charity has most generously given free service; but the merest fringe of the problem has not yet been touched.

Nearly one-third of the total patients treated were suffering from malaria, and in this connection one regrets to note that the practice of intramuscular injections of quinine or of cinchonine is increasing in the mofussil. The number of malaria cases treated annually is from 2 to 2½ million During the triennium 5,860 lbs. of quinine were purchased by the mofussil hospitals and dispensaries from the Juvenile Jail at Alipore at a total cost of Rs. 2,15,881, whilst an additional quantity of quinine worth Rs. 11,10,248 was sold by the jail to the public through the post offices. The high price of quinine and the inadequacy of funds on the part of the hospitals and dispensaries constituted a most serious medical problem for the province, as indeed for all India. Until India can be made self-supporting in her quinine and cinchona requirements this grave problem will continue. The districts of Burdwan, Nadia, Jalpaiguri and Rajshahi are mentioned as being especially notorious for malaria.

Kala-azar was also widely prevalent throughout the province, the number of cases treated in mofussil dispensaries rising from 3,198 in 1920 to 15,566 in 1922. These figures—in common with those for Calcutta city—do not indicate any great extension of the disease, but mean better diagnosis and improved and popular methods of treatment. The district boards of Tippera and Dinajpur are mentioned as having shewn notable activity in opening special treatment centres, and at the latter station a training class for medical officers to study this disease was opened.

The position with regard to leprosy has undergone a marked improvement. In addition to the work of Dr. Muir at the Calcutta School of Tropical Medicine and the proposal to build a new treatment and investigation centre for this disease at the School, the Mission to Lepers maintained the two hospitals at Bankura and Raniganj, and Government the one at Gobra. In all these institutions the most modern methods of treatment are adopted, and an increasing number of early cases are coming forward, with improved prospects of cure. Plans have been prepared for the new big leper settlement at Midnapore to hold 1,000 cases and the site already acquired. The Mission to Lepers contributed a sum of Rs. 52,000 towards this scheme, but—on account of the financial stress in the provincial budget—it was held up. The whole position with regard to leprosy is changing and changing for the better. The Act cannot be enforced until there is provision for the segregation of the pauper lepers who abound in all towns of the province; but with improved methods of treatment and the hospitalisation of the former "asylums," the outlook is good. Indeed the best way in which to stamp out the infection from a given town is not to segregate the old-standing and mutilated cases which are practically non-infective; but to establish leprosy clinics in easily accessible sites in the centres of the towns in order to attract early cases for diagnosis and treatment. What is wanted in medical practice in this matter is that practitioners should be trained to spot the early and as yet undiagnosed cases. (Some 15 per cent. of all patients attending the skin diseases out-patient clinic at the Calcutta School of Tropical Medicine are found—on bacteriological examination—to be early and undiagnosed—even unsuspected—cases of leprosy. If such cases are diagnosed whilst the lesions are still very slight, treatment is often surprisingly successful.) It is gratifying to read in the covering Government resolution to this report that Government hope to see within a few decades a very material diminution in the prevalence of this disease in Bengal.

The figures for surgical operations in the mofussil shew a large falling off, merely due to the fact that injections, spleen punctures, etc., have now been removed from the category of surgical operations. Actually the amount of surgical work undertaken shewed a steady increase; the number of selected and important operations rising from 5,496 in 1920 to 5,635 in 1922. Of 3,416 cataract cases dealt with, the success rate was over 95 per cent.

Financially the total income for institutions of classes I, III and IV was Rs. 16,63,630 in 1920, Rs. 19,23,534 in 1921, and Rs. 17,77,990 in 1922. Of this amount over 47 per cent. came from local funds, 18 per cent. from subscriptions and donations, 14 per cent. from provincial revenues, 13 per cent. from municipalities, and the balance from interest on endowments and other sources. A gift of one lakh by Raja Rao Jogendra Narayan Roy Bahadur for general improvements at the Berhampore Sadar Hospital calls for special mention; during the last twelve years this generous donor has contributed nearly three lakhs for medical relief in the presidency.

The total expenditure was Rs. 16,28,298 in 1920; Rs. 17,65,466 in 1921, and Rs. 17,44,891 in 1922. Of structural improvements, etc, effected, the reconstruction of the Mitford Hospital, Dacca—begun in 1916,—was completed, and the Madripur Victory Memorial Hospital, Faridpur, was also completed.

* * * * * * * *

It will be seen that, despite financial stringency and generally adverse conditions, the triennium witnessed steady and sustained improvement. Although several very urgent schemes had to be held up for want of funds, yet there was substantial advance in medical relief, medical—and especially post-graduate—education and medical research. Further progress is dependent upon three factors: an improvement in the provincial finances, a quickening of the activities of local bodies, and more generous financial assistance from the public. An additional and very important factor which is destined to play a most important part in the solution of the problem of medical relief in the mofussil areas was the introduction of the co-operative principle in the establishment and management of rural dispensaries. The Central Co-Operative Anti-Malarial Society came into existence during the triennium under the initiative

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of Rai Gopal Chandra Chatterji Bahadur, M.B., and may help to bring widespread relief with reference to both malaria and kala-azar.

Correspondence.

THE KALA-AZAR TRANSMISSION PROBLEM.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—The article by Knowles and Das Gupta on p. 292 of your issue for last June is of very great interest to me, in that it fits in with what I have come across in working out from census returns, the extraordinarily sensitive response of endemic kala-azar to any other adverse influence on the public health, such as an epidemic of malaria, an earthquake, or the recent influenza pandemic. The disease is so slow-moving in its epidemic manifestations that it was difficult to account for this slow response on the hypothesis of an introduction *de novo* of the infection into a devitalised population. On the other hand, this is easier to understand on the theory of a widespread, latent, symptomless infection in man, stirred into activity by the effects of a lowering of the individual vitality of the population concerned by the prevalence of other diseases or by economic hardship. My elaboration of this thesis does not appear in the paper which I recently read at the Royal Society of Tropical Medicine and Hygiene, and which is about to be published in their *Transactions;* but this paper was only an abstract of my forthcoming monograph on the disease as I have studied it during my 14 years in Assam. When the latter is published, it will be seen that there is a convergence of my own conclusions with those of these authors, but from entirely different points of approach; the work of these authors being experimental, and my own being from the epidemiological standpoint.—Yours, etc.

T. C. McCOMBIE YOUNG, M.D., D.P.H.,
Lieut.-Colonel, I.M.S.,
Late Director of Public Health, Assam.

ST. IVES, CORNWALL,
9th July 1924.

METHODS OF TREATMENT IN CHOLERA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I forward herewith the following comparative statement of the results of treating cholera cases with (1) Kaolin, (2) Essential Oils and (3) Potassium Permanganate Pills.

Kaolin and other treatments in Cholera.

Patients treated with.	Total number treated.	Cured.	Deaths.	Percentage.	
				Cured.	Deaths.
Potass Permanganate Pills and Drinks.	28	16	12	57·1	42·8
Kaolin and Potass Permanganate Drinks.	13	11	2	84·6	15·3
Essential Oils Mixture (supplied by Civil Surgeon, Saran).	20	13	7	65·0	35·0
TOTAL ..	61	40	21	65·5	34·4

The number of cases treated is only 61, but the results are sufficiently definite to deserve attention, and in my opinion they point clearly to the advisability of adopting kaolin as a standard treatment for cholera in rural areas, because the results appear to be eminently satisfactory and the treatment with kaolin is simple, safe and cheap. In fact it is practically fool-proof and may be entrusted to any layman of average intelligence.—Yours, etc.

W. C. ROSS,
Lieut.-Colonel, I.M.S.,
Director of Public Health, Bihar and Orissa.

PATNA,
23rd July 1924.

MALARIAL INFECTION AS A POSSIBLE CAUSE OF RAYNAUD'S DISEASE.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—The following case may interest your readers:—Gopal Singh, a Gurkha, aged 20 years, was admitted to this hospital on the 11th June 1924. A clinical diagnosis of malaria was made, and he was put on to quinine by the mouth. Blood films were unfortunately not examined. On the 14th he complained of severe pain in both legs, for which no obvious cause could be found. On the 15th both feet were found to be swollen and œdematous, but there was no other sign of any local inflammation. On this evening he developed symmetrical gangrene in both feet. On the right side the condition went on spreading; on the left, it did not progress so rapidly and the pain could be relieved a little. Hence operation was delayed in the hope that the condition in the right side would improve before operation. The patient died, however, on the 20th of June.—Yours, etc.

RAMA KRISHNA HANDA, B.SC., M.B., B.S.,
Resident Medical Officer,
Sir Ganga Ram Free Hospital.

LAHORE,
12th July 1924.

[*Note.*—The condition has been described before: e.g., by Guthrie, 1922. (*New Orleans Medical and Surgical Journal,* Vol. 74. No. 9, p. 604). In his case, however, the Wassermann reaction was positive, whilst blood films shewed a mixed infection with the parasites of tertian and sub-tertian malaria.—EDITOR, *I.M.G.*]

THE DYSENTERIES OF INDIA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In connection with the article by Majors H. W. Acton and R. Knowles "On the Dysenteries of India," published in your issue for last July, p. 325, one would like to make the following suggested additions:—

(1) Blood-stained mucous diarrhœa (dysentery) is very commonly due to the presence of some irritant substance, especially of intestinal worms, in the bowel, and this is very often confused with true amœbic dysentery.

(2) In the microscopic examination of a dysenteric stool, a film of the blood-stained mucus stained by Leishman's stain should be examined, as this will frequently give a diagnosis at sight of the type of dysentery present, especially when the specimen is not perfectly fresh.

(3) With regard to treatment, it is worth while to start treatment with a dose of oil of chenopodium or a dose of carbon tetrachloride; or a dose of both mixed; or of chloroform, eucalyptus and castor oil mixture. A dose of such a vermifuge mixture is, I consider, quite harmless to the patient, no matter what type of dysentery is present, and will eradicate helminthic infections which

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may be responsible for the dysentery, or be present as serious complications of it.—Yours, etc.,

SHAILENDRA MUKHERJI.

BOALIA, KALUPOL, P. O., NADIA,
15th July 1924.

[*Note.*—The suggestions are good. Such films from a bacillary dysenteric stool usually stain well by Leishman's stain, owing to their alkaline character and richly cellular content. On the other hand, films from the mucus of an amœbic dysenteric stool never stain well with Leishman's method. The only rapid method which we know of for staining such films is the hæmalum method advocated by Dobell and O'Connor, (*Intestinal Protozoa of Man*, 1921, p. 134), and search for motile *E. histolytica* is an easier and more rapid method. In fact staining is hardly ever necessary to establish the diagnosis. With regard to the administration of a vermifuge, dysentery in India is so commonly complicated with helminthic infections, that it can only do good.—EDITOR, *I.M.G.*]

INTRAVENOUS AIR EMBOLISM.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I have read with close attention the interesting letter by Dr. R. K. Bhattacharya published on the above subject in your issue for June 1924. In my own experience of over six years in the bacteriological laboratory here, I have had to give more than 50,000 intravenous injections; and on scores of occasions the passage of air into the circulatory system was so evident that it naturally caused not a little anxiety to me at first. So far, however, I have been spared the grief and mortification of having caused anybody's death.

My first experience of the sort was in the case of a patient who had been placed under my particular charge by Dr. S. R. Moolgaokar, F.R.C.S., who was then the Principal Medical Officer in this State. The patient was to be injected with a salvarsan apparatus. I proceeded as usual, but owing to an unexpected interruption forgot to remove the ligature before passing in the saline solution. This caused the blood to rush up into the apparatus and it filled a considerable part of the rubber tubing. The ligature was immediately removed, but as this was my first chance to come across a case of the kind, I became so nervous and confused that the pouring in of the 606 solution was delayed. The result was that as soon as the blood and the saline solution had passed on, air got into the vein, its admission becoming immediately manifest on account of a fairly audible bubbling sound produced in the vein. You can well realise my state of anxiety on hearing this bubbling. For ten minutes I could think of nothing else and every moment expected the death of the patient. The ten minutes passed; but there was no death. I questioned the patient several times as to how he was feeling; he gave no indication of anything unusual having taken place. After about half an hour I allowed the patient to go home. He returned to me the next week, as lively and healthy as he ever was.

Emboldened by this undreamt-of precedent, I began voluntarily to send in from one to two bubbles of air every now and then. There was no accident. I pushed my seemingly reckless experiments on and the last time I injected air, the amount was very nearly 3 c.c. I may add that whenever I inject air voluntarily, I always try to make sure that it does pass into the circulation.

So much for observation. Thanks to the kindness of the medical authorities of the State, injection is becoming increasingly popular in this city, and I never get less than thirty cases a day to deal with. I have not, however, been able to find out a satisfactory explanation of the harmlessness of small volumes of air injected into the vein, and would be very much obliged if any of your readers could suggest one. I shall be glad to furnish any other information or particulars that may be required. If Dr. Bhattacharya is still doubtful and suspicious of air embolism he is welcome to come here to see things for himself.—Yours, etc.

HAR PRASAD, L.M.P.,
In-Charge Bacteriological Laboratory,
B. D. Hospital, Bikaner.

3rd July 1924.

Service Notes.

APPOINTMENTS AND TRANSFERS.

Lieutenant-Colonel C. A. Gill, I.M.S., Assistant Director of Public Health, Punjab, is appointed to officiate as Director of Public Health, Punjab, with effect from 5th June 1924.

Major J. D. Sandes, I.M.S., officiating Civil Surgeon, is transferred from Rajshahi to Serampore, *vice* Major C. R. O'Brien, I.M.S., granted leave.

Major P. F. Gow, D.S.O., I.M.S., is appointed to act as a Civil Surgeon and is posted to Rajshahi, *vice* Major J. D. Sandes, I.M.S., transferred.

Major T. L. Bomford, I.M.S., officiating Civil Surgeon, is transferred from Howrah to Burdwan, *vice* Rai Hem Chandra Sarkar Bahadur.

Major R. Knowles, I.M.S., Professor of Protozoology, School of Tropical Medicine and Hygiene, Calcutta, is appointed to act, in addition to his own duties, as Professor of Tropical Pathology and Bacteriology and as Director of that institution, during the absence, on leave, of Major H. W. Acton, I.M.S.

Major C. J. Stocker, M.C., I.M.S., is appointed to officiate as an Agency Surgeon, with effect from the 26th March 1923.

The services of Major C. J. Stocker, M.C., I.M.S., an officiating Agency Surgeon, are placed at the disposal of the Government of India, Home Department, with effect from the 26th March 1923.

LEAVE.

Lieutenant-Colonel W. Gillitt, C.I.E., M.D., I.M.S., Inspector-General of Prison, Bihar and Orissa, is allowed leave for one year, with effect from the 1st May 1924.

Lieutenant-Colonel W. H. C. Forster, I.M.S., Director of Public Health, Punjab, is granted 18 months' leave with effect from 5th June 1924.

Lieutenant-Colonel C. A. Gourlay, D.S.O., M.D., I.M.S., Civil Surgeon, 24-Parganas, is allowed combined leave for twenty-eight months, with effect from the 15th October 1924, or any subsequent date on which he may be relieved.

Major C. R. O'Brien, I.M.S., Civil Surgeon, Serampore, is allowed combined leave for one year and six months, with effect from the date on which he may avail himself of the leave.

PROMOTIONS.

Majors to be Lieutenant-Colonels.

Arthur Francis Hamilton, M.B., F.R.C.S. Dated 1st August 1924.

Arthur Anderson McNeight, M.B. Dated 1st August 1924.

Arthur Denham White, M.B., F.R.C.S.E. Dated 1st August 1924.

Hugh Clive Buckley, M.D., F.R.C.S.E. Dated 1st August 1924.

Norman Methven Wilson, O.B.E. Dated 1st August 1924.

John Stevenson O'Neill, M.C., M.D., F.R.C.S.E. Dated 1st August 1924.

Mathew Robert Cecil MacWatters, M.B., F.R.C.S. Dated 1st August 1924.

William Haywood Hamilton, C.I.E., C.B.E., D.S.O., F.R.C.S. Dated 1st August 1924.

John Cunningham, M.D. Dated 1st August 1924.

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'Azoule' 'Pitibulin' with Adrenin—1 c.c. with gr. $\frac{1}{200}$. In boxes of 6 and 12.

'Pitibulin' Surgical

A 20 per cent. extract of infundibular body. This preparation is identical with 'Pitibulin' as hitherto supplied by this House. Its use is especially indicated to raise blood pressure in surgical shock and post-anæsthetic collapse. In very urgent cases it may be administered per rectum or intravenously diluted with normal saline.

Preparations:

'Azoule' 'Pitibulin' Surgical—½ and 1 c.c. in each. In boxes of 6 and 12.

Leaflet giving further particulars will be sent on request.

'Polyglandin'

(Trade Mark) **BRAND**

Pluriglandular Extract of Thyroid, Pituitary, Ovary and Testis,

made by Allen & Hanburys Ltd.

A synergist of proved value in disorders of the sympathetic nervous system, sex neuroses, senility and asthenic conditions generally.

It is now recognised that the functions of each endocrinic organ are plural rather than singular, and that the functions of the various secretory organs are interdependent in action; further, that normal metabolism depends upon the hormone balance being maintained. Treatment by pluriglandular extracts favours general secretory activity; many cases of apparently monoglandular deficiency benefit more by this treatment than by the administration of the extract from one sort of gland. 'Polyglandin' is a pluriglandular extract of proved efficacy. It enhances muscular, mental and nervous activity, promotes the elimination of toxins and is a general stimulant to the cardio-vascular system.

Preparations:

Elixir 'Polyglandin'—1 fluid drachm is equivalent to 5 grains of fresh mixed glands (including ½ gr. Thyroid Gland).

In 4 oz., 8 oz. and 16 oz. bottles.

'Kapsol' 'Polyglandin'—Each capsule is equivalent to 5 grains of fresh mixed glands (including ½ gr. Thyroid Gland).

'Azoule' 'Polyglandin'—15 mins. is equivalent to 10 grains of fresh glands (including 1 grain Thyroid Gland).

Leaflet giving further particulars will be sent on request.

Allen & Hanburys Ltd., London.

Special Representative for India:

A. H. P. JENNINGS, Block E, 2nd Floor, Clive Buildings, Calcutta.

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Major (now Lieutenant-Colonel) L. P. Brassey, M.B., I.M.S., to be acting Lieutenant-Colonel from 28th May 1916 to 16th March 1919, whilst commanding a Field Ambulance in Mesopotamia.

Captain (now Major) G. G. Jolly, C.I.E., I.M.S., to be temporary Major from 29th May 1918 to 16th January 1919, whilst employed as Deputy Assistant Director, Medical Services (Sanitary) in Africa.

Captains to be Majors.

Stephen Gordon, M.C., M.B. Dated 27th July 1924.

Basil Franklin Eminson, M.B. Dated 27th July 1924.

Anthony Kennedy. Dated 27th July 1924.

Jordan Constantine John, O.B.E., M.B. Dated 27th July 1924.

Lieutenant to be Captain.

Ram Nath Bhandari, M.D. Dated 25th February 1923.

Admission to the Indian Medical Service.

James Henry Barrett (late temporary Captain I.M.S.) with effect from the 1st September 1922.

Relinquishment of temporary commission.

Captain J. H. Barrett, I.M.S. (T.C.) with effect from the 1st September 1922.

RETIREMENT.

Lieutenant-Colonel J. J. Urwin, O.B.E., F.R.C.S., I.M.S., with effect from the 19th July 1924.

RESIGNATION.

Captain Kashinath Dattatraya Bhave. Dated 25th July 1924.

NOTICES.

LONDON SCHOOL OF TROPICAL MEDICINE. EXAMINATION RESULT. 75TH SESSION. APRIL—JULY 1924.

Distinction:—

Grace, A. W. Winner of "Laleaca" and "Duncan" Medals.
Yodh, B. B.
Rae, W.
Greaser, T.
Wallace, R. S.
Ramsay, G. C.
Dick, R.

Passed:—

Capt. Miss K. S.
Gittins, Mrs. E. M.
Irvine, M. L. C.
Tyborn, V. D.
Russell, Miss S.
Fehily, J. P.
Dunlop, W.
Nag, S.
Cochrane, R. G.
Waterman, J. A.
Bliss, R. P.
Mathur, H. G. D.
Ando, K.
Pateman, E. A. T.
Fisher, F. T.
Wellington, K. T. K.
Mackay, Miss E. K.
Timms, C. G.
Keer, Miss H.
Kibble, Miss C. B.
Casling, P. V.
Esler, A.
Gittins, R. J.
MacGregor, R.
Scutt, Miss R.
Nealor, W. S.
Stanbridge, R. H.
Mitchell, Miss D.
Allason, S. F.
Nayar, D. H.
Torrance, H. W.
Waller, G. R.
Dixon, P. K.
Webster, Miss G.
Neier, I. E.
Caffrey, P. J.
Stewart, C. L.
Edibam, C. R.
Taik, T. Chan.
Balmokand, T.
Saunders, G. F. T.
Khalsa, G.
Pope, G.
Elliott, G.

14th July 1924.

THE BRITISH DRUG HOUSES, LTD.

WE have received from the British Drug Houses, Ltd., a very interesting pamphlet dealing with the history of the firm and with its special exhibit at the Empire Exhibition at Wembley. The firm was formed in 1908 by the amalgamation of several leading London firms of manufacturing chemists and wholesale druggists, and as this well-illustrated booklet shews, there has been steady progress since. Branches and agencies have been opened all over the Empire, whilst there are over 1,200 employees on the pay roll of the company. Of many interesting products mentioned are carbon tetrachloride of guaranteed purity for internal use; "Duogen"—a purified hydrogen peroxide;—pure medicinal glucose, which was introduced at the request of the British Government during the war to replace the product which formerly came from Germany; "scale" preparations of iron, bismuth, quinine and other compounds; pure barium sulphate for *x*-ray work, and insulin of guaranteed potency and reliable keeping properties. In connection with insulin the output of the firm's factory at present reaches the large total of 200,000 doses a week. Other interesting features are specially purified chemicals for research work, laboratory stains standardised for use in bacteriology, histology and blood examination, indicators for pH work, and several pharmaceutical and toilet specialities. The Indian agent is Byram Mistry, 119, Parsee Bazar Street, Bombay.

THE "PHOKU" PHOTOGRAPHIC MICROSCOPE EYEPIECE.

ONE of the latest and most attractive of microscope accessories manufactured by Messrs. Carl Zeiss of Jena, is their new Siedentopf "Phoku" Photographic Eyepiece. This partakes of the nature of a reflex camera fitting, and with it micro-photographs 6 × 4½ cm. can be taken on photographic plates, whilst the observer at the same time watches the object photographed through the reflex silvered eyepiece. The apparatus fits the ordinary Zeiss microscope without adaptation. Focussing is made as sharp as possible by the use of a ruled plate on which to focus; whilst when once permanently focussed, the focus is constant once for all. This apparatus is one of real value to the laboratory worker; not only does it enable micro-photographs of sections and of permanent preparations to be taken, but—provided that the illumination is sufficiently intense,—instantaneous micro-photographs of spirochætes, trypanosomes, motile bacilli, etc., can be taken. We have now had one of these photographic eyepieces in use for some months, and their convenience, adaptability to a wide range of conditions and general usefulness is very great. In effect the eyepiece saves hours of time which would be otherwise employed on adjusting larger micro-photographic outfits for work, and the finish and workmanship are of the highest order, as the maker's name guarantees. The Indian agents are Messrs. Adair, Dutt and Co., 22, Canning Street, P. O. Box 2009, Calcutta.

BRITISH EMPIRE EXHIBITION, 1924.

Burroughs Wellcome & Co.'s Exhibits.

BURROUGHS WELLCOME & Co. have no less than four exhibits. The Main Exhibit is admirably fitted in design and colour to emphasise those ideals of purity and quality which are notably associated with 'Tabloid' products, with the firm's fine chemicals and medicinal preparations. This note of quality is repeated in the beautiful display of crystals and by the original and handsome design of the glassware in which many of the products are shown.

The immense quantity of raw material necessary for the production of the exceptionally pure and highly concentrated 'Wellcome' Brand Insulin Hydrochloride and the intricate stages in the production of 'Wellcome' Brand Insulin as issued are very strikingly demonstrated in a special exhibit.

'Tabloid' medical equipments are given prominence and the unique position Burroughs Wellcome & Co. hold in having equipped every expedition of importance since the days of Stanley is well brought-out by the display of historical medical equipments, including that carried by Stanley through "Darkest Africa," that carried to the South Pole by Scott, and that carried to the North Pole by Peary. As an example of the

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firm's medical equipments for naval and military expeditions the historical case supplied to the hospital ship "Maine" is also shown.

The compactness and portability of these 'Tabloid' medicine cases in view of the quantity of their contents is a point which is obvious to the eye; but as a *tour de force*, demonstrating the wonderful skill in manufacture attained by long study and experience, the smallest medicine case in the world with its twelve phials each containing perfectly compressed 'Tabloid' products will reward attention. It measures but 5|8ths of an inch on its longest side.

The 'Wellcome' Materia Medica Farm has an exhibit to itself, consisting of a most interesting display of living medicinal plants from the firm's farm at Dartford, together with a collection of herbarium specimens.

'Kepler' Malt Products are shown in another exhibit, attractively arranged and decorated in the Egyptian style.

'Tabloid' photographic chemicals are utilised to make a fourth very striking display of Burroughs Wellcome & Co.'s activities. A feature of this exhibit are the beautiful and bold examples of the results obtainable with these products. A fine view by the official photographer of the Mount Everest Expedition and a picture of Commander Wild taken in the crow's nest of Shackleton's ship are not only bold and arresting pictures but emphasise the value of 'Tabloid' chemicals for different and important work. A giant 'Wellcome' Calculator enables all visitors to this exhibit instantly to ascertain the correct exposure for the day and hour.

'TABLOID' NUCLEO-LECITHIN COMPOUND.

To the comprehensive series of compressed products issued by Burroughs Wellcome & Co., there has been added 'Tabloid' Nucleo-Lecithin Compound, in which nuclein, lecithin and the glycerophosphates of calcium and potassium are combined as indicated by the formula below:—

Nuclein	gr. ¼
Lecithin	gr. ½
Potassium glycerophosphate	gr. 1
Calcium glycerophosphate	gr. 1

For nuclein has been claimed a powerful action in stimulating the formation of leucocytes, thus raising the opsonic index and increasing the power of resistance against infection.

Lecithin presents phosphorus in organic combination and in a readily assimilable form. Regeneration of nerve tissue, it has been stated, is rapidly effected by the administration of lecithin, which has the additional advantage of being able to enrich the blood by increasing the number of red corpuscles, thus assisting general nutrition and recuperative power.

The addition of the glycerophosphates of calcium and potassium is designed to exert a special selective action on the nervous system.

'Tabloid' Nucleo-Lecithin Compound is sugar-coated so that the lecithin component is well disguised and at the same time protected from deterioration due to atmospheric action. The compound may be administered with any diet as a restorative, nutrient and reconstituent in nervous and nutritional disorders.

Made by Burroughs Wellcome & Co., and issued under the 'Tabloid' brand, it has the guarantee, skilled preparation and accuracy which are associated with this origin and mark.

'Tabloid' Nucleo-Lecithin Compound is supplied in bottles of 25 and 100.

Having received, through the courtesy of Messrs. Burroughs Wellcome & Co. a bottle of 'Tabloids' of this new preparation, we selected for its trial an English male adult patient suffering from kala-azar complicated by incessant crops of boils. The total leucocyte count before administration was 4,800 per c.mm. After 8 days of administration it was over 8,000 per c.mm., and there was definite clinical improvement in the patient's condition.

THE OLDEST PRESCRIPTION IN THE WORLD.

In the July 1924 issue of *The Bloodless Phlebotomist*, a trade journal issued by the manufacturers of Antiphlogistine,—the Denver Chemical Manufacturing Co., 22, Grand Street, New York—there are two very interesting items. The first is an account of a visit paid by the immortal Sarah Bernhardt eighteen years ago to a drug store in New Orleans in search of a medicinal clay suitable for application as a face beautifier and to overcome wrinkles. The druggist advised trial of a small sized tin of Antiphlogistine. "It is not for you, Monsieur," replied the distinguished actress, "to say how large an amount Sarah Bernhardt shall buy. Send me at once to the hotel a dozen of the largest boxes"!

The second is an illustration of what may be the oldest known prescription in the world, inscribed upon a stone tablet, discovered in Egypt and said to be some 3,400 years old. The ingredients prescribed by the ancient doctor-priest concerned are as follows:—

Lapis lazuli	2 parts.
Green stone	2 parts.
Iky-bu, fumigating ..	1 part.
Shemyst, from Aethiopial ..	1 part.
Kemyt	1 part.
Wine	1 Keb-jug.

Anyone who has studied physicians of the present day will have no difficulty in imagining this ancient physician counselling his patient that the shemyst must be nothing but the genuine Ethiopian brand and no other, that the kemyt must be freshly made, and the iky-bu above reproach. The formula was given for "ball in the throat," and was presumably administered by fumigation.

The publishers state that they will be glad to forward a copy of the journal upon application.

Publishers' Notice.

Scientific Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles will receive 25 reprints of the literary pages of the "*Gazette*" *gratis*, if asked for at the time of submitting their manuscripts.

Reprints of the article concerned (only), in place of reprints of the whole of the literary matter of the issue, can be supplied if preferred and asked for. But as these have to be made up separately, they are necessarily delayed.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to The Editor, *The Indian Medical Gazette*, c|o Messrs. Thacker, Spink & Co., P. O. Box 54, Calcutta.

Communications for the Publishers relating to Subscriptions, Advertisements, and Reprints should be addressed to The Publishers, Messrs. Thacker, Spink & Co., P. O. Box 54, Calcutta.

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Papers and articles forwarded for publication are understood to be offered to the *Indian Medical Gazette* alone, and any breach of this rule will be followed by non-publication.

The Editors of the *Indian Medical Gazette* cannot advise correspondents with regard to prescriptions, diagnosis, etc., nor can they recommend individual practitioners by name, as any such action would constitute a breach of professional etiquette.

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Original Articles.

ANIMALS AS DISSEMINATORS OF HOOKWORM EGGS AND LARVÆ.

By ASA C. CHANDLER, Ph.D.

(Hookworm Research Laboratory, Supported by the Indian Jute Mills Association), Calcutta School of Tropical Medicine.

THE relation of animals, particularly domestic animals, to the spread of human hookworm disease is a question which has interested a number of investigators in recent years. It is a matter of very considerable importance since, especially in the tropics, many domestic animals are in the habit of devouring human fæces, and when it is accessible make it a regular article of diet. Ramsay (1923), for instance, writing of conditions on a tea-estate in Assam, says "Practically all animals in Cachar eat human fæces, perhaps in virtue of their sodium chloride content, for cows will frequently refuse to drink boiled rice water unless common salt is added. It is a common sight to see cows and sheep licking the soil where coolies have passed urine." Pigs are notoriously coprophagous in habit, and are very commonly looked upon in India as of benefit about coolie lines or in villages on account of their function as scavengers. McVail (1922), for instance, after having tried to infect pigs with human hookworms by means of infective larvæ, says "The results were negative and as the Indian village pig is a natural scavenger and devourer of refuse, including fæcal matter, it is probable that the presence of pigs in a village or in garden lines does more good than harm." Dogs, likewise, are almost universally coprophagous in India, and even if well fed will almost invariably devour human fæces if they get access to them. Rats also are fond of human fæces and their burrows or runways can nearly always be found in the vicinity of latrines or places used for defæcation. Chickens are not so fond of the fæces themselves as of the maggots which develop within them, but they devour a considerable quantity of the fæces along with the maggots.

There are three possible ways in which these various animals may play a part in the dissemination of hookworm infection; first, by serving as hosts for the adult parasites, and thus scattering the eggs in their fæces just as do human beings; second, by carrying fæcal matter containing eggs or larvæ on their feet and dropping such material at some more or less distant place; and third, by devouring fresh fæces and evacuating the eggs contained in them in their own fæces, in an unchanged condition.

As regards the first method, all the domestic animals except the pig may be eliminated. It is true that *Ancylostoma duodenale* will rarely develop to maturity in dogs and in cats, but this is at best a rare occurrence. Among hundreds of ankylostomes obtained from dogs and cats in Calcutta, not a single specimen of *A. duodenale* has been obtained. *A. caninum* is the predominating species in dogs, and *A. braziliense* (or *ceylanicum*) in cats. The question of the identity of *Necator americanus* of man and *N. suillus* of pigs is a point which has not yet been definitely determined. Ackert and Payne (1922) discovered the presence of a Necator in a large percentage of pigs in Trinidad, and on the basis of certain morphological differences which were more fully described later (1923) decided that they belonged to a distinct species which they named *N. suillus*. Gordon (1922) also discovered a Necator in pigs in Amazonas and, although somewhat smaller in size, decided that it was identical with the human species. Later Gordon (1923) made careful comparisons of considerable numbers of individuals from human beings in Jamaica and Amazonas and from pigs in Amazonas, and came to the conclusion that none of the characteristics enumerated by Ackert and Payne were really distinctive, being merely average differences with a considerable degree of overlapping. Infection experiments by Ackert and Payne, as Gordon has pointed out, are negative only if *N. suillus* is distinct from *N. americanus*, and this, as has already been pointed out, is still uncertain. Gordon carried out a single experiment in Liverpool in which 400 infective larvæ were injected into the back of a pig on the 15th and 29th of December respectively. On January 19th ankylostome-like ova first appeared in the fæces in scanty numbers, and were found on some but not all days up to February 5th. On the next four days the examinations were negative and the pig was killed and examined for helminths on February 9th. No worms except Trichuris were found. Whether or not the ova previously found were those of *Necator americanus* derived from the experimental infection is, of course, purely speculative.

Goodey (1923) tried to infect two pigs bred in England with *Necator americanus*, one of them by applying a paste containing larvæ in culture to the skin of the groin for 50 minutes, until the paste had dried, and six weeks later by administering 200,000 larvæ by mouth. The second pig was given a similar dose by mouth. The first pig was killed 2½ months after the first experiment, and the second 5 weeks and 3 days after the experimental feeding, both with negative results. Both pigs harboured *Œsophagostomum dentatum*, the eggs of which resemble hookworm eggs, and this is commented on as being a possible source of error in searching for hookworm eggs in experimentally infected pigs.

To further test this point the writer obtained three young pigs, about six weeks old, and

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repeatedly examined the fæces, by means of the Kofoid and Barber technique, for a period of one week, and also made cultures, all of which were negative for hookworm ova, although two of the pigs were passing large numbers of nematode eggs containing developed embryos, and measuring 40 to 45μ by 25 to 28μ. On 24-3-'24 pig No. 3 was injected under the skin of the abdomen with about 500 larvæ of *Necator americanus*. On 1-24-'24 pig No. 1 was exposed to infection by holding the nose for five minutes in contact with some garden soil on which about 750 active sheathed larvæ a week old had been placed. Pig No. 2 was exposed to infection on the same date by placing about 1,500 of the same larvæ in two or three c.c. of water on the skin of the groin, the pig being held on its back for about ten minutes to allow the larvæ to penetrate. It is estimated that about one-third of the larvæ burrowed into the skin. There was slight irritation of the skin of the groin of this pig, but No. 1 did not show any irritation of the nose. None of the pigs showed any lung symptoms at all. About one month later, 25-4-'24, the stools of all three pigs were examined by the Kofoid and Barber method and by means of cultures, and were found negative for hookworm eggs and larvæ. Repeated examinations of the same kind were made thereafter at intervals of about one week or ten days for about four months, but no hookworm eggs or larvæ were ever found. The nematode infection which had been present in pigs Nos. 1 and 3 at the beginning of the experiment died out in the course of about two months, and has not reappeared. Pigs Nos. 2 and 3 were re-injected on 15-5-'24, about six weeks after the first injection, each being given about 1,000 young active larvæ under the skin of the abdomen, but without result.

These negative results are not, of course, conclusive. They merely indicate that the pig is not readily susceptible to infection with *N. americanus*. The question of speciation in parasites as related to host relationships was recently discussed by the writer (Chandler 1923) and numerous instances were cited in which parasites showing slight morphological and physiological differences were found to occur in different host species. Size particularly has a tendency to vary in different hosts, the most striking example being that of the gapeworm, *Syngamus trachealis*, in chickens and turkeys. The small number of worms developing from massive infections is a common phenomenon. Few or no adult worms may develop from ingestion of many thousands of *Ascaris lumbricoides* eggs by a suitable host. Similarly in the case of *Hymenolepis nana*, experiments attempting to infect rats or mice with eggs of human origin, and vice versa, frequently fail, whereas in other cases they have succeeded. The writer's contention (1923) that hostal races of parasites correspond in a general way to geographical races of free-living organisms, and should be looked upon as varieties or sub-species, seems quite applicable to the case of the Necators of pig and man. The report by O'Connor (1920) of *Ancylostoma* in a pig in the Ellice Islands, which closely resembled *A. duodenale* except for its smaller size, and the finding of ankylostomes identified as *A. duodenale* by Legg and Rheuben (1921) in three pigs in Queensland, only adds weight to the probability of the Necator infections of pigs being of human origin, the average differences being of an adaptive or selective nature. The close relationship, parasitologically, between pigs and man would lead one to hesitate to separate specifically parasites found in these two hosts unless the differences shown by them were very well marked. *Balantidium coli* and *Iodamœba williamsi* among the protozoa, *Gastrodiscoides hominis*, *Fasciolopsis buski* and *Paragonimus westermanni* among the trematodes, *Cysticercus cellulosæ* and hydatids among the cestodes, *Trichinella spiralis*, *Ascaris lumbricoides*, *Strongyloides stercoralis* and possibly *Trichuris trichiura* among the nematodes, and *Gigantorhynchus hirudineus* among the Acanthocephala, present an imposing array of parasites which are interchangeable between pigs and man. That *Necator americanus* and *Ancylostoma duodenale* might likewise be interchangeable is more probable than otherwise.

As regards the second method of dissemination of hookworm larvæ, little need be said. It is too obvious to need argument that chickens, pigs, cattle, dogs and other domestic animals tend to scatter hookworm eggs and larvæ on their feet and other parts of their bodies. The recent work which has been done to show the practical non-existence of active lateral migration on the part of the hookworm larvæ in soil, however, throws greater importance on this method of dissemination, since its elimination becomes of greater value than if active lateral migration on the part of the hookworms actually took place. Pigs and other hoofed animals are of particular importance in this connection since the amount of fæcal material which will adhere to their feet is relatively great. The scratching of chickens is, of course, important also in widening the infective zone around a fæcal deposit.

The third method of dissemination, by passing the eggs unaltered through the digestive tract, is of particular importance, and one which has been largely overlooked. One of the first investigations on this subject was by Calmette and Breton (1905) who showed that human hookworm eggs would pass through the digestive tract of dogs uninjured. Ackert (1922) showed that hookworm eggs ingested by chickens are to a large extent destroyed, probably by grinding in the gizzard, though a certain percentage pass through unharmed. Ackert and Payne (1922) carried out similar experiments on pigs, and found that the eggs passed through these animals apparently uninjured, and developed in cultures and under natural conditions into infective larvæ in even greater numbers than in the original fæces. McVail

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(1923) called in question the validity of Ackert and Payne's work, since he himself did not succeed in obtaining healthy hookworm larvæ passed through pigs in this manner. Ramsay (1923) pointed out the relative unhealthiness of the tea gardens in which pigs were allowed a free run. He purchased six pigs from tea-garden coolies, in none of which did he find hookworms or Trichuris, and in only one of which was a "round-worm closely resembling *Ascaris lumbricoides*." In all six, however, microscopic examination showed ova of hookworm, round-worm and whip-worm in the contents of the stomach, small intestine and large intestine. Culture of rectal contents was positive for hookworm larvæ in three of the six cases. In eleven additional post-mortems in which no hookworms were found, ova of hookworm, Trichuris and round-worms were again found in the stomach and intestine. In most cases he found evidences of human fæces with human helminthic ova in the buccal cavity and œsophagus. McVail (1923) in a letter to the editor of the *Indian Medical Gazette* asks how Ramsay proved the nematodes which he obtained from culture to be human hookworm embryos, pointing out that this also was not stated by Ackert and Payne. He stated that he had hatched thousands of larvæ from pigs which had eaten human fæces and from others which had not. An enormous proportion of these were demonstrably not human hookworm embryos, whereas those that were morphologically indistinguishable were feeble and did not survive more than a few hours. McVail considers this to be due to a destructive effect of the temperature (104°) of the pig's body. Ramsay (1924) —replying—points out that hookworm larvæ will hatch out from eggs passed by patients suffering from pneumonia and malaria with temperatures ranging from 102° to 105°.

In view of the conflicting opinions held in respect to this important question, it seemed advisable to repeat the work done by Ackert and Payne in Trinidad. Consequently three pigs about six weeks old were obtained and kept in the animal room on the fourth floor of the school building, where there is a cement floor which is washed daily. The pigs' fæces were examined for a week by the Kofoid and Barber method and found to be free from any eggs which could be confused with hookworm eggs. Two of the pigs evacuated small embryo-containing nematode eggs, which are described above. On 24-3-'24 at 4 P.M., pigs 1 and 2 were fed on human fæces containing numerous hookworm eggs, mixed with bread, pig 3 being kept as a control. Fæces from all three pigs were obtained before 8 A.M. the next morning, and none of them contained any hookworm eggs. Pig 1 passed a stool about noon on the same day (25-3-'24) and this contained large numbers of apparently healthy hookworm eggs. By 3 P.M., the other two pigs had passed stools; pig 2's stool contained large numbers of hookworm eggs, while pig 3's contained none. Pigs 1 and 2 continued to pass hookworm eggs in decreasing numbers on the 26th and 27th, pig 3 remaining negative, and on the 28th all of them were negative. Most of the eggs even on the 27th were not beyond the morula or tadpole stages of development, and none were seen with fully developed embryos. It is evident, therefore, that human hookworm eggs are able to live through at least 72 hours at the high temperature of a pig's body in the absence of oxygen. The latter no doubt accounts for the retardation of development, since it is well known that fæces kept in tightly-closed tins may contain viable four-celled eggs even for four or five days. The fæces from the pigs were cultured, some in charcoal and some in sterile garden soil, as follows, all the cultures being extracted from 12 to 15 days after being made:—

Pig 1.—25-3-24, 8 a.m. No hookworm larvæ; numerous larvæ of another species, evidently developed from the other nematode eggs seen in the fæces.

25-3-24, noon. Very abundant sheathed hookworm larvæ; numerous larvæ of other species.

26-3-24, 10 a.m. Abundant sheathed hookworm larvæ; numerous larvæ of other species.

27-3-24, 10 a.m. A few sheathed hookworm larvæ; numerous larvæ of other species.

28-3-24, 10 a.m. No hookworm larvæ; numerous larvæ of other species.

Pig 2.—25-3-24, 8 a.m. No larvæ of any kind.

25-3-24, 3 p.m. Very abundant sheathed hookworm larvæ; no other larvæ.

27-3-24, 10 a.m. A few sheathed hookworm larvæ; no other larvæ.

28-3-24, 10 a.m. No larvæ of any kind.

Pig 3.—25-3-24, 8 a.m. and 3 p.m., 26-3-24, 27-3-24, and 28-3-24. No hookworm larvæ; other nematode larvæ, of same species as in Pig 1, abundant in all cultures.

Unfortunately the infection with the nematodes which produced the small embryo-containing eggs and the larvæ which were recovered in company with the hookworm larvæ in pigs 1 and 3 died out subsequently, so the species was not determined. The larvæ measure 590 to 640 μ in length with a diameter of about 19 μ. The œsophagus is very long, measuring 280 to 300 μ nearly half the length of the body. The nerve ring is 91 to 96 μ from the anterior end. The tail is stiff, evenly tapering, and slightly truncated at the tip. The anus is 33 μ from the tip of the tail, and the diameter at the anus is only 5.5 μ, The intestine has a finely granular appearance. After extraction in water, these larvæ lie quiet, stretched out perfectly straight, and show no movement except a slight bending of the head back and forth.

There can be no reasonable doubt but that the larvæ recovered from the pigs' fæces for three days after feeding with material containing hookworm eggs were really hookworm larvæ, since they conformed in every morphological detail, and in movements and behaviour, with known hookworm larvæ with which they were compared. They were kept alive in water in the laboratory for several weeks and were used along with other larvæ in migration and stimulation experiments, and showed no peculiarities whatever. The number of larvæ obtained from cultures made

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from the first stool in which eggs were found was much greater than was obtained from cultures made directly from the same stool that was fed to the pigs, a fact which corroborates the findings of Ackert and Payne.

A similar experiment was carried out with a rat. A high percentage of rats in Calcutta are infected with a species of Heligmosomum, to be described elsewhere, the eggs of which so closely resemble hookworm eggs, except for the somewhat more advanced state of development, that it was not practicable to use them for feeding hookworm eggs.

A rat which was free from any nematode eggs in the fæces was finally obtained, examined for a number of days to be certain that no nematode eggs were being overlooked, and was then fed with bread mixed with human fæces containing hookworm eggs. For three days after ingestion the fæces of this rat contained eggs resembling hookworm eggs, in progressively smaller numbers, and in various stages of development from the four-celled to the developed embryo state. After the third day no more such eggs were found. Cultures were made from the droppings before, during and after the finding of the hookworm eggs, and produced typical sheathed hookworm larvæ only on the three days following the ingestion of the eggs. It is evident, therefore, that rats are capable of scattering viable human hookworm eggs in their droppings after eating human fæces containing them.

Calmette and Breton's (1905) experiment on dogs was also repeated. After having tried in vain to find a dog in Calcutta which was free from hookworm infection, a dog was given a dose of 10 c.c. of carbon tetrachloride. Its fæces were then examined by the Kofoid and Barber method for a week, and they were uniformly negative for hookworm although Toxascaris eggs were found.

On 16-8-'24 at 4 P.M., the dog was fed with fæces containing approximately two million hookworm eggs, mixed with bread, part of which was vomited about three hours later. Subsequent stools were saved and examined, with the following results:—

18-8-'24. A.M.—Hookworm eggs very abundant, apparently healthy, from four-celled to tadpole stages of development.

19-8-'24. P.M.—A few hookworm eggs, mostly in morula stage.

20-8-'24. P.M.—Eggs in the fæces more abundant than on preceding day, many in four-celled stage.

22-8-'24. A.M.—Same as on 20-8-'24.

23-8-'24. P.M.—Same as on 20-8-'24.

Cultures made from the stools on 18-8-'24, 19-8-'24 and 20-8-'24 produced only small numbers of larvæ, the reason for which is not apparent. It was evident, since fairly numerous eggs were being passed daily a week after the dog had been fed on hookworm eggs, that the dog had either had access to other fæces containing hookworm eggs, or, what is more likely, that it had not been cleared of its own hookworms by the dose of carbon tetrachloride given. Consequently a second dose of 10 c.c. of carbon tetrachloride was given on 25-8-'24. On 27-8-'24 and 28-8-'24 no nematode eggs could be found in the stool. On the latter date fæces containing, according to egg count, about 2,000,000 eggs, mixed with raw meat, were fed. Subsequent stools were saved and examined, with the following results:—

29-8-'24. No stool passed.

30-8-'24. A.M.—Very abundant eggs in the stool, estimated at 2,000,000 by egg count. Eggs apparently healthy, from four-celled to tadpole stages of development.

31-8-'24. Stool lost.

1-9-'24. P.M.—No eggs found by Kofoid and Barber method.

3-9-'24. A.M.—No eggs found by Kofoid and Barber method.

Cultures were made from the stools of 30-8-'24 and 1-9-'24. The first stool produced very abundant active sheathed hookworm larvæ. In the second stool, of 1-9-'24, only two hookworm larvæ were found. On 4-9-'24 the dog was killed and the entire gastro-intestinal tract and liver were carefully examined, but no worms of any kind could be found. Calmette and Breton's work was, therefore, fully corroborated.

Summary and Conclusions.

It is evident from experiments performed by myself and others that domestic animals constitute an important means of scattering human hookworm eggs and larvæ. They do this either (1) by acting as hosts for the parasites, (2) by transferring fæces or earth containing eggs or larvæ on their feet or other parts of their bodies, and (3) by ingesting egg-containing fæces and scattering the undamaged eggs in their own droppings.

Although *Ancylostoma duodenale* will occasionally develop to maturity in dogs or cats, these animals are negligible as hosts of human hookworms. Pigs harbour a species of Necator which closely resembles the human species, and is probably merely a hostal variety of it. They also occasionally harbour *Ancylostoma duodenale*.

The spread of eggs and larvæ by the feet and bodies of domestic animals and by the scratching of chickens is obvious. The value of the elimination of this means of dissemination appears greater in view of the absence of active lateral migration on the part of the larvæ themselves.

The passage of eggs unharmed through the digestive tracts of pigs, rats, and dogs has been proven. In chickens a high percentage is destroyed, probably in the gizzard. Since these various animals feed very commonly on human fæces, this constitutes an important means of dissemination. It has been shown that after feeding on human fæces viable hookworm eggs are passed for at least 72 hours in the droppings of these animals.

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In view of these facts, the devouring of fæces by pigs, rats, dogs or other animals, with the possible exception of chickens, cannot be looked upon as desirable on account of the destruction of so much refuse, but rather as a very dangerous process resulting in the dissemination and not the destruction of the most injurious component of the material, namely the eggs of human intestinal parasites.

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INDIAN SANTONIN.

Extracted from the Indian species of Artemisia maritima.

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Indigenous Drug Series, No. 3.

SANTONIN is one of the most expensive drugs which we have in the pharmacopœia. Its current market price is as much as Rs. 720 per pound, a single dose of 3 grains costing nearly a rupee. As the drug is used largely in this country for the treatment of Ascaris and Oxyuris infections as well as in sprue, it is of economic importance. Practically all the santonin used in India is of Russian manufacture and is imported from Europe. It is obtained from *Artemisia cina* Berg but there are many allied species, such as *A. maritima* L., *var. Stechmanniana* Besser (*A. lercheana* Karel and Kiril), *A. pauciflora*, Stechm, etc., which are indigenous to the vast uncultivated plains of the Kirghiz in Turkestan. A number of species of Artemisia are also widely distributed over different parts of Europe, Asia, and America. Some years ago, large quantities of the strongly aromatic flower heads were collected and sent to the European markets, especially to Moscow and Petrograd; some also found their way to Bombay via Afghanistan and Persia. Such is not the case now, as factories have been established in some of the large towns in Turkestan where santonin is extracted, and mainly the purified product is now exported. Of late years there has been a great scarcity of santonin owing to political and economic disturbances in Russia; also, owing to wasteful and destructive methods of harvesting in Turkestan, the plant is in serious danger of extermination there.

Efforts have been made therefore to find other sources of the drug with a view to increasing the output. Van Laren has successfully cultivated *A. cina* in Holland, which has yielded as much as 1.3 per cent. of santonin. Some of the American species of Artemisia, *A. mexicana* and *A. neomexicana*, which grow wild in Mexico, and in New Mexico and the neighbouring states, also yield santonin. Professor Greenish has suggested the possibility of India supplying not only her own needs but also having a good deal of surplus for export and Dr. J. L. Simonsen of the Forest Research Institute and College, Dehra Dun, has given strong support to this view.

Indian Species of Artemisia—A. maritima.

Artemisia maritima Linn (*A. brevifolia* Wall) grows in the dry inner valleys of the Western Himalayas from Kumaon to Kashmir (Baltistan) at an altitude of 4,000 to 12,000 feet above the sea level. According to Dr. Parker, the Forest Botanist, it grows more abundantly and uniformly in Baluchistan, Chitral and Afghanistan than in the Himalayas. It is used as a packing material for fruit which is imported from Kandahar. The drug is called *kirmala* or *kirmani* in Hindi; *shih*, *sarifun* and *afsantin-el-baher* in Persian and Arabic. It is a very ancient remedy and was used by the Greeks and Romans to expel intestinal worms. The old Arabian and Persian physicians used it for the same purpose, and it was introduced into India and is commonly employed in the Tibbi medicine as an anthelmintic. Usually the flowering tops are powdered and given in 2 to 4 drachm doses. Its other uses

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quoted by the authors of this system are to stop hiccough and as a remedy for dropsy. Externally it is recommended for application to boils and inflammatory swellings and to promote the growth of the hair. A decoction made from the plant, which would consist mainly of the essential oil, is used as a cardiac and respiratory stimulant. An oleaginous extract made from the plant, which contains both the essential oil and santonin, is used for application to wounds and internally in ascites. No mention of this drug is made by the old Ayurvedic writers and it is not included in their materia medica. *A. maritima* grows in certain parts of Kashmir State and the authorities are making efforts to collect the plant and give facilities for extracting santonin. Messrs. Smith, Stanistreet & Co., one of the leading firms of manufacturing pharmaceutical chemists in Calcutta, have experimentally extracted a quantity of the drug and we are very grateful to this firm and to their head chemist, Mr. C. S. Cooper, for supplying us with a sufficient quantity of this Indian santonin for purposes of chemical, physiological and clinical investigations.

Chemical composition of A. maritima.

The active principles consist of:—

1. A volatile oil, which has an odour resembling cajuput oil and camphor. The physiological properties and pharmacological action of this oil are under investigation.

2. A neutral principle—*santonin*—which is responsible for the anthelmintic properties, and an allied body, *artemisin*. The amount of santonin extracted from the Russian Artemisia usually is 1.2 to 1.4 per cent., but may be as high as 2.3 to 3.6 per cent. The yield from the Kashmir variety is comparatively small, and even by the improved method devised by Smith, Stanistreet & Co., it did not go beyond 0.5 per cent. This may be due to the fact that the santonin content of *A. maritima* is naturally low, or the plant may not have been collected at the right time of year. It is a well known fact that santonin disappears after flowering of the plant, and if the specimens are collected at such a time the yield is small. Simonsen has shown that the plants collected in June in Kashmir (Gurez) showed no santonin content at all, those collected in July and August showed from 0.1 to 1.0 per cent., the latter being the maximum yield; in the first half of September 0.1 per cent.; and after that it was entirely absent, or only slight traces present. Another factor which may possibly be responsible is that the *A. maritima* used for extraction had been collected and stored for some time and the leaves, which contain most of the santonin, may have fallen off, leaving mostly the stalks, which have no santonin.

Physical and Chemical properties of Indian Santonin.

The following table gives a description of the physical and chemical properties of the Indian santonin as compared with the variety imported from Europe. It will be seen that it comes practically up to the same standard of purity. The small differences are due to traces of impurities, which cannot be removed by recrystallisation. These, however, have neither any deleterious effects, nor do they interfere with the action of the drug. The Indian santonin (Smith, Stanistreet brand) satisfied all the tests of purity laid down by both the British and the United States Pharmacopœias.

Imported santonin. (Standard).	*Indian santonin.* (Smith, Stanistreet brand)
1. Very sparingly soluble in cold water. Soluble in 40 parts of cold rectified spirit, in 3 parts at the boiling point and in 4 parts of chloroform.	Same as the standard.
2. Crystallises in flattened rhombic prisms, in feathery radiating groups. Odourless. Tasteless at first, but afterwards develops a bitter taste. The cold alcoholic solution has an extremely bitter taste.	Same as the standard.
3. On sublimation becomes reddish brown, evolves white fumes and on cooling sets to a clear brown vitreous mass, which is reddened on treatment with a little dry alkali, e.g., slaked lime.	Same as the standard.
4. On exposure to light, especially to direct sunlight, santonin acquires a yellow colour. The hot alcoholic solution of this altered substance is yellow, but deposits crystals of colourless santonin on cooling.	Same as the standard
5. Lævo-rotatory in chloroform = — 171.4.	Lævo-rotatory in chloroform. = — 161.2
6. Melts at 169° to 171° C.	It softens at 169° C. and melts completely at 171° C.
7. Sp. Gr. 1.1866.	
8. Percentage of C. H. C = 73.17 per cent. H = 7.31 per cent.	C = 70.4 per cent. H = 6.5 per cent.
9. Leaves no appreciable ash	0.1 grm. incinerated. No ash remained.

Pharmacological action of Indian Santonin.

The behaviour *in vitro* of earth-worms, ascarides, etc., in solutions of Indian santonin in oil is the same as with the European variety. We tested the toxicity of the drug on a series of cats and found that this variety was not more toxic than the European variety, and as much as 90 mgm. could be given to a cat weighing 2 kilogrammes without producing any untoward effects. A series of cats whose stools were previously examined and found to contain ova of Belascaris and hookworm were given the drug in doses ranging

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Patient No. and Age.	Ascaris eggs per gram. of faeces.	Preliminary purge and starvation.	Time.	Santonin, etc. given.	Time.	Subsequent purge.	Time.	Ascarides recovered.	Symptoms.	Ascaris eggs in stool, subsequent examination.	REMARKS.
Hospital 427 (16)	4500	None.	..	Santonin gr. 3, calomel gr. 2, Sod.bicarb. gr. 4.	10 p.m.	Mag. sulph. 1 oz.	6 a.m.	2	None	None	Previously passed 3 female Ascaris after chenopodium.
428 (ad.)	2450	No food after 4 p.m. Mag. sulph. 1 oz.	10 p.m.	..	6 a.m.	None	..	..	,,	..	Left hospital, so stools saved only 24 hours.
430 (ad.)	——	,,	10 p.m.	..	6 a.m.	,,	..	?	,,	,,	Stools lost 2nd day; patient noticed worms.
436 (ad.)	1837	,,	10 p.m.	..	6 a.m.	,,	..	1	,,	,,	
444 (4)	——	No food after 4 p.m.	..	Santonin gr. 2·5, calomel gr. 0·5, Sod. bicarb. gr. 4.	10 p.m.	Mag. sulph. 2 dr.	6 a.m.	3	,,	,,	
452 (5)	——	No food after 5 p.m.	..	Santonin gr. 3, calomel gr. 1, Sod.bicarb. gr. 4.	10 p.m.	Mag. sulph. 2 dr.	6 a.m.	7	,,	Present	
453 (ad.)	——	,,	..	Santonin gr. 4, calomel gr. 5, Sod.bicarb. gr. 4.	10 p.m.	Mag. sulph, 1 oz.	6 a.m.	1	,,	,,	
454 (2½)	——	,,	..	Santonin gr. 2, calomel gr. ½. Sod. bicarb. gr. 2.	10 p.m.	Mag. sulph. 2 dr.	6 a.m.	None	,,	None	
Jail 1 (ad.)	8700	Liquid diet 24 hours.	..	Santonin gr. 4, calomel gr. 5, Sod.bicarb. gr. 5.	5 p.m.	Mag. sulph, 1 oz.	8 a.m.	..	,,	,,	
2 ,,	3550	,,	..	,,	,,	,,	,,	4	,,	,,	
4 ,,	5750	,,	..	,,	,,	,,	,,	..	,,	,,	
5 ,,	6600	,,	..	,,	,,	,,	,,	4	,,	,,	
6 ,,	100	,,	..	,,	,,	,,	,,	..	,,	,,	
7 ,,	300	,,	..	,,	,,	,,	,,	..	,,	,,	
8 ,,	300	,,	..	,,	,,	,,	,,	1	,,	,,	
9 ,,	6100	,,	..	,,	,,	,,	,,	4	,,	,,	
10 ,,	2600	,,	..	,,	,,	,,	,,	1	,,	,,	
11 ,,	450	,,	..	,,	,,	,,	,,	..	,,	,,	
12 ,,	500	,,	..	,,	,,	,,	,,	1	Nausea during night; vomited twice. Vomited several times after purge. Giddiness; cramps in fingers.	,,	
13 ,,	5000	,,	..	,,	,,	,,	,,	1	None	,,	
14 ,,	2150	,,	..	,,	,,	,,	,,	1	Nausea during night; vomited after purge.	,,	
15 ,,	100	,,	..	,,	,,	,,	,,	..	None	,,	
16 ,,	No count made.	,,	..	,,	,,	,,	,,	2	,,	,,	
17 ,,	150	,,	..	,,	,,	,,	,,	1	Vomited in night. Giddiness and drowsiness next day up to 3 p.m.	,,	
18 ,,	No count made.	,,	..	,,	,,	,,	..	2	None	,,	
19 ,,	50	,,	..	,,	,,	,,	,,	..	,,	,,	

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from 45 to 90 mgm. The Ascarides were expelled and their ova disappeared from the stools.

Clinical Trials.

With the assistance of Dr. A. K. Mukerji, assistant in the Hookworm Research Laboratory, we have tested the drug as an anthelmintic on a few cases infected with Ascaris and hookworm in the Carmichael Hospital for Tropical Diseases, and on a series of 18 cases infected with Ascaris in the Alipore Central Jail, Calcutta. We wish here to express our appreciation of the whole-hearted co-operation received from the Superintendent of the Jail, Lieut. H. A. Young, I.M.D.

The Indian santonin was accompanied in all cases by calomel and sodium bicarbonate. The amounts given and the details of preliminary and subsequent purges are given in the table.

All of the jail cases were kept on a liquid diet on the day that the drug was given. The stools from the hospital cases were saved and washed for 72 hours after the administration of the drug, those from the jail cases for 48 hours only. All of the patients' stools were re-examined for ova by the Kofoid and Barber technique 10 days later. As will be seen by reference to the table, the results compare very favourably with those ordinarily obtained with European santonin. Caius and Mhaskar (1923) gave 5 gr. doses of the latter to 19 men, curing 6 out of 9 who were given the drug in the morning, followed by a purge two hours later, and 8 out of 10 were given the drug in the evening followed by a purge next morning. Caius and Mhaskar obtained only 52.1 per cent. of cures with 48-minim doses of oil of chenopodium, but we have succeeded in curing 56.7 per cent. of 37 cases with 30 minims given in divided doses of 10 minims each at one hour intervals. Santonin is, therefore, more effective than chenopodium, though much more expensive.

Two of our hospital cases harboured hookworms as well as Ascaris; case No. 427 passed 15 *Ancylostoma duodenale*, but was subsequently still positive for hookworm; case No. 436 passed 11 *Ancylostoma duodenale*, but on subsequent treatment with carbon tetrachloride passed 178 *Ancylostoma duodenale* and 146 *Necator americanus*. The apparent differential effect on Ancylostoma is very interesting. Two other hookworm cases were treated with santonin but passed no hookworms, though both passed a few Oxyuris.

Conclusion.

Santonin extracted from *A. maritima* Linn (*A. brevifolia* Wall), which grows in the mountains of Kashmir (Baltistan), closely resembles in its physical, chemical and physiological properties the santonin imported from Europe. It satisfies all the tests laid down in the British and United States Pharmacopœias. Its therapeutic efficacy is just as good. The present market price of the Indian santonin is Rs. 670 per pound, but if it is worked on a larger scale we have no doubt it could be considerably reduced.

We have much pleasure in expressing our indebtedness to Dr. A. K. Mukerji, Capt. P. De and Mr. N. R. Chatterjee for their help in this research. To Messrs. Smith, Stanistreet & Co. of Calcutta we are grateful for supplying Indian santonin, and to the Kashmir State Council, and especially to Mr. D. Nagerketti, Member in charge of Industry and Commerce, for supplying sufficient quantities of *A. maritima* Linn (*A. Brevifolia* Wall).

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A PRELIMINARY NOTE ON THE PHARMACOLOGICAL ACTION AND THERAPEUTIC PROPERTIES OF KUTH ROOT —*SAUSSUREA LAPPA*.

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(*Indigenous Drug Series No.* 4).

MANY species of Saussurea grow in the Himalayas at an altitude ranging from 2,000 feet to 13,000 feet above the sea level. The only species which has been used for its medicinal properties is *S. lappa* which grows in the North-Western portion of the Himalayas, especially on the moist slopes of the mountains round the valley of Kashmere. That is why among its various names one is *Kashmera* which means coming from Kashmere. The plant is well known both in the Ayurvedic and Tibbi medicine. It is called *kut, kot, kushi* (costus) or *patchak* in Hindi (Sanskrit—*Kushta* or *Kashmirja*) and *kust* in Arabic and Persian. For a long time a good deal of confusion existed as to which one of the large number of species of *costus* was used for its medicinal properties by the ancients, but Falconer has proved beyond doubt that the root of *Aucklandia costus*—now known as *Saussurea lappa*—was the species. The

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plant grows as a very stout herb with large heart-shaped leaves, annual stem and thick perennial roots which are dug up in the months of September and October and are exported to Calcutta and Bombay in large quantities. From there the root is shipped to China and the Red Sea, and is used as a spice, as an incense and medicinally. So great is the demand that the Kashmere State authorities have started on a large scale nurseries and plantations of it under the Forest Department, and it is a great source of revenue to the State. The root has a peculiar aromatic fragrant smell which resembles that of orris root, and a bitter pungent taste. The uses of this root have been summarised by Baden Powell in his "Punjab Products" in the following terms:—

1. "Dried and powdered as the principal ingredient in an astringent stimulant ointment, applied to severe ulcerations.
2. Dried and powdered as a hair wash.
3. As a stimulant in cholera; an infusion made of cardamoms 1 dr., fresh kut 3 drs., water 4 ounces. One ounce every half hour. It is doubtless a powerful aromatic stimulant, and would be serviceable in any spasmodic disease.
4. It is universally employed by shawl merchants as a protector of Kashmere fabrics from the attacks of moth and other vermin.
5. The dried root is an agreeable fumigatory and yields excellent pastilles which burn fairly well.
6. It is exported in enormous quantities to China, where it is used as an incense. In every *hong* it is found; no mandarin will give audience until the *patchak* incense smokes before him; in every joss-house it smoulders before the Tribuda diety; in every floating junk in the Chinese rivers, —the only home of countless hordes,—Buddha's image is found, and the smoke of the *patchak* religiously mends its way heavenwards.....It is said to have the power of turning grey hair black. Carminative, stimulant, antiseptic, prophylactic, astringent, sedative, and insecticidal properties are referred to this remedy. The Chinese apply it with musk to aching teeth."

The root is smoked in parts of India and in China as a substitute for opium.

Chemistry of S. lappa.

The drug was analysed by Schimmel and Co. (1892) who found that it contained 1.0 per cent. of essential oil with a strong fragrant and penetrating odour. Later, Semmler and Feldstein (Ber, 47,1914,2433,2687) made a thorough study of this oil. It has a specific gravity of 0.982, a rotatory power of 15° 20′ in a 100 mm. tube. Its boiling point is 275° C. and above 315° C. the oil decomposes, giving a vapour with a very disagreeable odour. Little or no attention has been paid to the other constituents of the root, though mention has been made of the presence of small quantities of an alkaloid. Dr. Sudhamoy Ghosh in collaboration with Mr. Nihar Ranjan Chatterjee made a complete analysis of the dry root, which was kindly supplied by the Kashmere State authorities. They found that besides the essential oil, and the alkaloid, there was a body of glucosidal nature in fairly large quantities. The composition of the root according to this analysis is as follows:—

1. Essential oil	..	0.86 per cent.
2. Alkaloid	..	0.2 per cent.
3. Glucoside	..	Exact proportions not yet determined.
4. Resins	..	8.3 per cent.

The details of this work will be published separately.

Pharmacological action of S. lappa (kuth).

We tested the action of the three active principles separately. On undifferentiated protoplasm the essential oil has a markedly toxic action, but the action of the alkaloid is not so pronounced, and the glucoside has little or no action at all in this direction. In concentrations of 1 in 2,000 the essential oil kills *Paramœcium caudatum* instantaneously; 1 in 5,000 solutions slow the movements rapidly, the paramœcia crawl along the bottom, move in circles and die in less than 5 minutes.

Even a dilution of 1 in 10,000 produces a definite effect; the movements of the ciliate become sluggish and some of them die in 10 minutes. The alkaloid in a concentration of 1 in 400 kills the paramœcia and 1 in 1,000 produce slowing and death in 10 minutes, but this was probably due to the acid reaction of the salt of the alkaloid and not to any inherent property of the alkaloid.

We also tried the bactericidal properties of these bodies on *staphylococcus albus* and *aureus streptococcus, B. coli* and *B. diphtheriæ,* and the results are given in the following table.

Bactericidal action of Kuth essential oil.

Organism.	Approximate dilutions.				
	1-2,000.	1-3,000.	1-4,000.	1-5,000.	1-10,000.
Streptococcus pyogenes aureus	+	+	±	±	±
Staphylococcus aureus and albus	+	+	±	±	±
B. coli	±	±	—	—	—
B. diphtheriæ	±	—	—	—	—

+ No growth : ± inhibition : — no effect on growth.

The alkaloid—except in concentrations of 1 in 500—produced very little effect. These experiments show the strong antiseptic and disinfectant properties of the essential oil against streptococci and staphylococci, and one can understand why the drug is used in the form of an ointment against boils, ulcers, wounds, etc.

Externally.—The essential oil has a strong fragrant, aromatic smell. The odour is very penetrating and adheres for a long time to the

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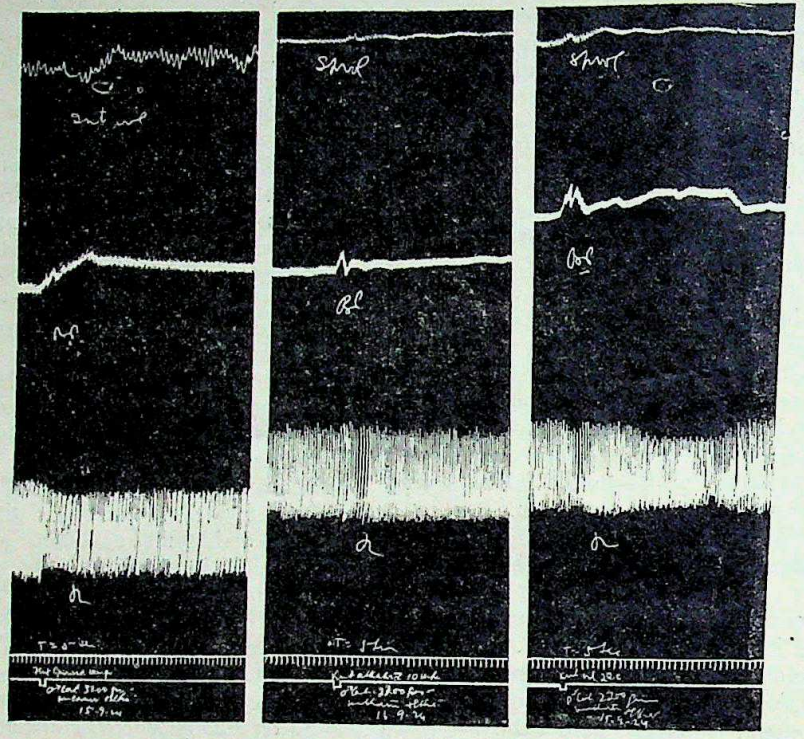
part on which it is applied. The Chinese use it largely as a scent. The oil is only slightly irritating, when applied to the skin and mucous membrane. Subcutaneous injections of this oil, as well as those of the alkaloid and glucoside, produce no irritating effects.

Internally.—The extract made from the root has a pungent bitter taste in the mouth. In the

GRAPH I.

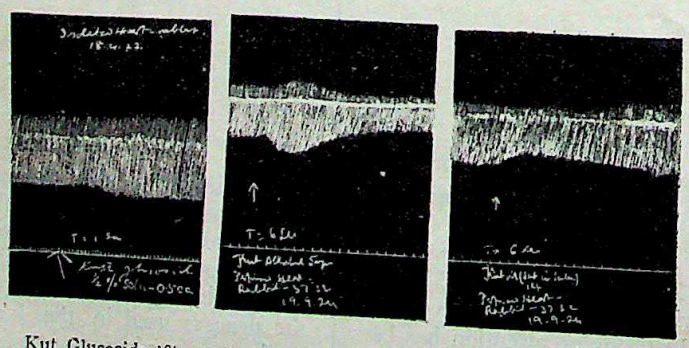


Kut Glucoside 10 mgm. male cat 3,200 gms. urethan and ether.

Kut Alkaloid 10 mgm. male cat 2,200 gms. urethan and ether.

Kut oil sat. saline soln. 2 c.c. male cat 2,200 gms. urethan and ether.

GRAPH II.



Kut Glucoside ½% soln. 0·5 c.c. Perfusion isolated Heart—rabbit.

Kut Alkaloid 5 mgm. Perfusion isolated Heart—rabbit.

Kut oil sat. saline soln. 1 c.c. Perfusion isolated Heart—rabbit.

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stomach it gives rise to a feeling of warmth; the powdered root has a similar effect. After large doses, 10 to 20 c.c. of the extract (1 c.c. = 1 gm. of the root) the patients may complain of a feeling of discomfort in the abdomen, lasting for several hours, and sleepiness. No other untoward effects were noticed. The drug has mild carminative properties but does not produce any increase of intestinal peristalsis or purgation. On the isolated intestine of rabbits the effect of the essential oil in approximate dilutions of 1 in 120,000 to 1 in 60,000 is to inhibit the movements; the rhythm is interfered with and the peristaltic movements become irregular. The alkaloid produces an increase of tone and amplitude, the glucoside inhibits the movements without interfering with their rhythm. Intravenous injections of these active principles in small doses have no effect on the peristaltic movements. Intestinal volume, however, shows a definite increase, probably due to vaso-dilation (*see* graph I). The spleen and kidney volumes also show some increase, indicating that the effect probably involves the whole of the splenic area. Section of the vagi does not alter these effects in any way.

Circulatory System.—Intravenous injections of a saturated solution of the essential oil in saline (2 mgm.) cause a slight rise of blood pressure, which is not steady but often shows slight oscillations. The glucoside produces a small but persistent rise of blood pressure and a slight increase in the amplitude of the heart beats. This effect is very much more marked in some animals than in others. The alkaloid has hardly any action on the blood pressure. Section of the vagi produces no alteration in these effects. On the perfused isolated heart of the rabbit both the alkaloid and the glucoside have a stimulating effect, the amplitude being increased without alteration in the rhythm; there is some after-depression in the case of the alkaloid. Weak concentrations of the essential oil, i.e., approximately 1 in 10,000 to 1 in 15,000 are depressing, but the effect soon passes off. (*see* graph II).

From these experiments the use of this drug as a stimulant in diseases like cholera and typhus, where the circulatory system is much depressed, can be comprehended. The alkaloid and glucoside stimulate the heart directly and the essential oil probably acts reflexly, giving rise to pressor effects.

Respiratory System.—Both the essential oil and the glucoside given intravenously have a slight though a definite broncho-dilator action. This was much more marked as a rule in the dog, which is essentially a vagotonic animal, than in the cat, which is sympatheticotonic. This effect disappears when the vagi are cut. It would appear therefore that the drug acts by inhibiting the increased tone of the vagus which occurs in a class of asthmatics and hence its reputation in the treatment of this disease. The alkaloid has no action in this respect. Inhalation of the oil in animals under anæsthesia produces no effect on the bronchial musculature. The drug has a well marked expectorant action.

Genito-Urinary System.—The essential oil is partly excreted by the kidneys and we are enquiring into its antiseptic properties in the urine. The liquid extract given internally has a marked diuretic effect; in one of our cases, a boy aged 13 years, the quantity of urine rose from 20 to 70 ounces. The kidney volume is slightly increased, owing to vaso-dilation. None of the active principles have any noticeable effect on the isolated uterus of the rabbit or the guinea-pig.

Central Nervous System.—No effect is seen with ordinary therapeutic doses; larger doses of the extract produce giddiness, headache and sleepiness, due probably to depressing effect of the essential oil on the central nervous system. When smoked, the drug produces some stimulation which lasts a few minutes; soon the patient feels dizzy and sleepy and this depression lasts several hours. Larger amounts are said to produce narcosis like opium smoking.

Clinical Trials.—From the earliest ages, the drug has been used in India in a variety of conditions. In Ayurvedic medicine it is used as a tonic, and as an aphrodisiac and in diseases of the respiratory tract, especially asthma.

We are informed by Mahamohopadaya Kabiraj Gana Nath Sen, M.A., L.M.S., that it is extolled for the treatment of malaria in the Atherva-Veda. Tibbi writers recommended it against rheumatism, in persistent hiccough and as an anthelmintic. The therapeutic properties of the drug and the claims made regarding it are under investigation and will be published in detail later. More work is necessary before any definite conclusions can be arrived at. We will briefly refer however to the results obtained so far.

The drug is recommended in spasmodic conditions of the respiratory passages, especially when the bronchial musculature is contracted. The rationality of this view is borne out by our experiments on animals. A large class of asthmatics in India come under the category of vagotonics. In these patients the action of the vagus is increased, owing to certain causes, producing spasm of the bronchial musculature and vaso-dilation of the bronchial mucosa, which give rise to asthmatic attacks. These effects can be relieved by giving atropine, which diminishes the vagus action, or adrenalin, which stimulates the antagonistic action of the sympathetic. Both these drugs have obvious disadvantages. The *kuth* root appears to have a marked and lasting effect in decreasing vagal tone and at the same time relieves the congestion of the bronchial mucosa by its expectorant action, which, at any rate, is absent in the case of atropine. So far it has proved to be a very useful drug in these cases. We have tried the alcoholic extract in a series of cases of asthma

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and found that it not only had a remarkable effect in relieving the spasms, but it also prevented recurrence of attacks, loosened the phlegm and cleared the respiratory passages. A patient in the hospital who was so bad that he could not sleep at night without an injection of adrenalin, when put on 2 to 4 drms. of the extract three times a day, had no recurrence of attacks while the drug was being administered. All our asthmatic patients benefited under this treatment. In one case of persistent hiccough in which we tried the extract, the patient was markedly relieved. In Tibbi medicine it is recommended for rheumatism and much stress is laid on its anthelmintic properties. In collaboration with Drs. McVail and A. K. Mookerjee of the Hookworm Research, the drug was tried in the Carmichael Hospital for Tropical Diseases on cases of hookworm, Ascaris, Trichuris and Tænia infections. It was given in the form of powdered root, and as alcoholic extract; magnesium sulphate being given 2 to 3 hours afterwards. In some cases giddiness and headache occurred, but very few worms were expelled. As an anthelmintic the drug is of little value. This was borne out by our experiments with some of these entozoa *in vitro;* the parasites kept alive and active for hours in very concentrated solutions of the active principles. Dr. Muir, in charge of the Leprosy Research, very kindly tried the powdered root and the essential oil locally in some cases of leprosy, but no benefit resulted.

Conclusions.

1. The active principles of *Saussurea lappa* are (*a*) an essential oil; (*b*) a glucoside; (*c*) an alkaloid.

2. The essential oil and the glucoside are pharmacologically active bodies. The alkaloid is less active.

3. The essential oil has strong antiseptic and disinfectant properties especially against the streptococcus and staphylococcus; the alkaloid and the glucoside have little or no effect in this direction.

4. The glucoside causes a small but a persistent rise of blood pressure; the essential oil does this to a lesser degree.

5. Both the glucoside and the essential oil have a slight but a definite broncho-dilatory effect. The alkaloid is inactive in this respect.

6. The powdered root and the alcoholic extract are expectorant and are beneficial in asthma. They cut down attacks and reduce their frequency.

7. The drug has no anthelmintic properties.

We have much pleasure in expressing our gratitude to Dr. Sudhamoy Ghosh, M.Sc. (Cal.), D.S.C. and Mr. Nihar Ranjan Chatterjee, M.Sc., who carried out the analysis of this root. This involved very hard work extending over a year, and the details will be published by them separately. To Dr. A. K. Mukerji, Assistant to the Hookworm Research Worker, we are grateful for trying the drug in cases infected with intestinal parasites.

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SURGICAL SUNDRIES.*

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ANÆSTHESIA.

THIS is a subject of importance, whether you are dealing with accidents or disease, with clean or septic cases. In my student days administration of an anæsthetic was practically synonymous with administration of chloroform.

At the present day our duty demands very much more than this and yet in India how often does one see a patient subjected to excruciating pain for want of any anæsthetic, making a noise which distracts the attention of surgeons and attendants, struggling in a way which makes accurate work impossible, and suffering an altogether unnecessary degree of shock. Or again, how often does one see a patient brought amongst total strangers, laid upon a table, a mask suddenly clapped over his mouth, a suffocating atmosphere created in which he strikes out or struggles in terror of his life, only to find himself set upon by able-bodied persons who hold his arms and legs down to the table. Put yourself in the place of either of these patients and try to think how you would like it. But the matter is not one of mere sentiment. In both these cases, the patient has been subjected to a quite unjustifiable degree of shock and not infrequently, the results of shock are, to say the least of it, very disconcerting.

I recollect, once, a case of a man with retention of urine on whom I proposed to pass a catheter. I found he had a very small meatus and I thought I could stretch it with one or two of the smaller bougies. I did so quite gently as I thought but without an anæsthetic. The man complained of considerable pain during the procedure. No further manipulation was necessary as he felt an inclination to pass urine voluntarily after a slight dilatation. Later, this man collapsed and in 24 hours he died of shock.

This is an extreme case, but I want to impress on you the very real danger of shock, and to bring

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*Being a paper read before the Medical Section of the Asiatic Society of Bengal, on July the 9th, 1924.

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out the present-day elaboration of anæsthesia in relation to shock.

The condition of shock is caused by the five factors anxiety, fear, pain, hæmorrhage, and sepsis. These factors acting alone or in combination can produce the condition.

The circumstances of operation may lay the ordinary patient open to the play of all five factors, but at present we are particularly concerned with the first three, viz., anxiety, fear and pain. Think of a layman, ignorant of all that our training has taught us, with his inborn dread of injury. He is sick and goes to his doctor feeling uneasy and worried, for he cannot tell what ails him. The doctor has to tell him that an operation is necessary. The vague mental picture before him adds to his worry or anxiety. He determines to follow the advice given and summons up courage to go to hospital where he is surrounded by strangers to whose guidance he must submit himself. His anxiety is still further increased. He learns that on the following morning the operation will take place and his anxiety gives way to fear, which in the absence of special consideration is augmented as I have described, and in regular sequence is followed by pain.

Potentially for anyone, operative procedure spells a period of anxiety, followed by a period of actual fear, followed by a further period of pain. It is our duty to diminish these factors, as far as possible, in order to reduce shock to a minimum. Hence gentleness, sympathy and calmness on the part of the dressers, nurses and surgeons are not a mere matter of sentiment. They are the weapons with which we can and ought to overcome the worry or anxiety of the pre-operative period. The second period—that of fear—is overcome by the injection of 1|6th of a grain of morphia before the patient is carried from his bed to the theatre. After such an injection his senses are dulled and he is reduced to a state of drowsiness in which he does not notice the otherwise terrifying surroundings. Morphine is usually combined with 1|120 gr. of atropine—its physiological antidote—or less frequently 1|200 gr. of scopolamine. This treatment—preventive of the stage of fear—is found to have further advantages in that a less quantity of the general anæsthetic is required, and consequently restlessness and vomiting are less marked in the post-operative stage.

Coming now to the abolition of pain, you will readily understand that the actual pain comes from the injury caused at the seat of operation and this must be distinguished from terrifying sensations received in the brain through the senses of sight, hearing, and smell.

The painful stimuli from the seat of operation can be prevented by painting on a mucous surface or by injecting into and below the skin a solution of novocaine 1 per cent. to 2 per cent. apothesine, or other drug of that class. This is described as the infiltration method of using a local anæsthetic. Similar effects with greater range can be obtained by blocking the main branches at a distance from the seat of operation (regional method), or by injecting the local anæsthetic into the spinal column in the region of the cauda equina.

When a drug like chloroform is used for anæsthesia, the effect of small dosage is to deaden the high cerebral centres, a larger dosage is required to deaden the lower centres and a still larger dosage is necessary to abolish reflexes, and so get the patient beyond the influence of painful stimuli. If, however, a local anæsthetic is used in addition, it is not necessary to push the chloroform beyond the amount required to deaden the higher centres. Thus the introduction of local anæsthesia *as an addition* reduces the dangers of overdosing with chloroform to a minimum.

The dangers of heavy dosage of chloroform are considerable. Apart from the immediate dangers, we observe that where prolonged administration is required the patient develops an acidosis with its accompanying restlessness and vomiting. Nowadays, using such adjuncts as morphine and novocaine, we find that the amount of chloroform required does not produce acidosis and there is no restlessness and vomiting after operation as a rule. That is, delayed chloroform poisoning is practically never seen.

From these remarks you will readily understand that local anæsthesia alone is in trifling cases in healthy men sufficient, while for more severe procedures or in more nervous patients morphine followed by novocaine is suitable, and this is our favourite combination for hydroceles, hernias, etc. We used chloroform after morphine for the same class of cases but are gradually eliminating this, and for any extensive or severe operation, we combine morphia and novocaine with light chloroform anæsthesia.

By giving careful consideration to the object in view, namely, the prevention of shock, you will see that it is practicable to meet most circumstances without using dangerous amounts of any of the drugs, and the production of anæsthesia is no longer the source of anxiety that it used to be.

Fractures.

Another subject to which I am sure it will be profitable to turn our thoughts for a time is that of fractures. Great improvements have been made in the methods of dealing with fractures and they form a very appreciable part of our work. My own experience suggests that we are further behind the modern teaching in this part of the world than we ought to be, and that is my reason for directing your thoughts to the subject to-night.

The method of dealing with fractures in vogue when I was a student was the old immobilisation method. You must remember that the X-rays were just beginning to be used and the knowledge obtained by skiagrams had not had time to affect the teaching.

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Caird and Cathcart in 1914 wrote of the old method: "The old immobilisation method of treating fractures consisted of setting the bones and fixing firmly with splints not only the seat of fracture but also the joint above and the joints below the broken bone. This immobilisation was kept up until the bone was united, which took place in from three to six or eight weeks. After that in many cases the limb was enclosed in plaster of Paris for several weeks to allow the union to solidify. On removal of the plaster, the patient was told to use his limb. However, great difficulty was generally experienced in doing so, and a long and tedious convalescence had to be faced to restore more or less completely the functions of the joints and muscles."

The authors comment on this method. Rigid fixation by impeding the circulation delays union of the bones and encourages atrophy of the muscles, while it permits of adhesions forming in and around the joints, also between the muscles and around the nerves. Once these adhesions have formed, it is generally difficult and often quite impossible to get rid of them.

I am convinced that the bad results of the old method were in part due to failure to diagnose the exact nature of the fracture, incomplete restoration of the bony deformity, or failure to maintain the restoration obtained at the time of setting, as well as to the atrophy of muscles and formation of adhesion.

Hey Groves synopsises the modern teaching in five instructions:—

(1) Diagnosis and observations of the exact nature of the fracture, from the outset and at frequent intervals during the course of treatment by means of the X-rays.

(2) Restoration of the bony deformity so that nothing but partial lateral displacement or impaction without alteration of the axis of the limb is allowed.

(3) The retention of this restored position so that displacement does not occur during healing.

(4) Preservation of the vigour of the muscles and circulation from the outset by early movements.

(5) Early restitution of functional utility by properly graduated exercises.

As one thinks over these five instructions, one cannot help realising that while the last two are dependent on the care of the surgeon, the first three involve in addition the use of the X-rays.

(1) X-ray centres are still very rare in Bengal and the vast majority of practitioners have to make the best of things without skiagraphy. They can, therefore, carry out only imperfectly the first three, but more or less perfectly the last two instructions.

In former days, when X-rays were unknown, a fracture had to be diagnosed by a combination of such signs as deformity, abnormal mobility, crepitus, pain and loss of function. The X-rays have shewn that many fractures escaped under the diagnosis of sprains and bruises.

Even if we take it that by these means the existence of a fracture can in most cases be diagnosed, it still remains to ascertain the exact nature of the fracture.

The approximate site of the fracture can be conjectured from such evidence as the deformity, if this can be appreciated through the fleshy parts, or by the site of acute pain on gentle pressure. The direction of the fractured surfaces and the relative position of the ends it is practically impossible to diagnose accurately. The only guide is a careful study of the nature of the accident to discover the direction in which the external forces happened to fall.

Such methods of getting at the truth are very cumbersome and more often than not information as to the nature of the accident is very scanty. It is not to be wondered at, if the average man arrives at no exact diagnosis or at a wrong one. The advent of X-rays very soon proved that this was the case, and the progress of X-ray work has been such as to make all these cumbersome inaccurate methods of secondary importance in most countries.

Have you ever tried to deal with a fracture without skiagrams, and when you had done all that you were able to do, sent the case to be X-rayed for your own information? If you have, I expect you are a very humble man. Fortunately, functional result is often better than we would expect from the anatomical result and so some X-ray plates may be unnecessarily depressing.

Take the following case as an example. The patient was believed by his doctor to have a fractured femur and was put up with extension. After two months, there was atrophy of muscles, stiffness of all the joints and no union. I took the case into the Sambhu Nath Pundit Hospital and in due course had it X-rayed. This plate shewed that there was an oblique fracture in the upper third of the femur with an outward displacement of the upper fragment. The upper end of the lower fragment was lying almost against the pelvis.

Hey Groves pleads for diagnosis and observation of the exact nature of the fracture. Here the doctor had diagnosed fracture, but he had made no allowance for the outward direction of the upper fragment in his extension, hence presumably he had not got an exact diagnosis. If the fracture was ever set, the extension had failed to maintain the restoration of the bony deformity.

Two and a half months after the fracture, and finding that I could not even extend the leg, not to talk of retaining the restored bony deformity, I resolved to cut down on the parts and drive into the medullary cavities a peg taken from the tibia of the same leg. I then put the leg up in extension, slightly abducted. Six weeks later a second X-ray plate was taken. The peg was in good position but even now the abduction of the

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lower fragment was insufficient. This patient left hospital seventeen weeks after his injury against advice. He had got to the stage of graduated exercises. He could bend his knee slightly and he could walk with a patten on the sound foot and crutches. There was one inch of shortening.

Now the best treatment of this case would have been somewhat as follows:—

Immediately on diagnosis of fracture, it should have been put up with a Thomas' splint and support below the thigh and sent for an X-ray plate.

The plate would have shewn the obliquity of fracture and thrown a suspicion on the possibility of keeping the parts permanently in position. It would also have shewn that some abduction was required. Thereafter the patient should have been anæsthetised, after having been subjected to a spell of massage, and placed on some form of splint which would bring the lower fragment upward and outward, and then extension should have been applied in the axis of the upper fragment.

An X-ray examination would then have shewn whether the restoration of the bony deformity was complete.

A further X-ray examination, made after an interval of one week, would have shewn whether the position of restoration was being retained, in which case extension would be continued, and if not the open operation and bone pegging would have been done. Thus 2½ months would have been saved at the beginning, and it is impossible to say how much at the end of treatment.

In a case of fever, you use all your clinical experience in your effort to ascertain its cause but you look for confirmation to the clinical laboratory. Similarly, in dealing with a fracture make every effort short of causing further damage to deduce from your observations the nature of the fracture, but it is just as necessary to obtain an X-ray plate to confirm your findings as to secure a clinical laboratory report in a case of fever.

I wish to emphasise this point for two reasons:—

(i) You cannot do your best work in fractures unless you have seen the skiagrams.

(ii) The mere union of a broken bone in a faulty position is frequently a very great handicap, often completely disabling a man from returning to the occupation to which he has been trained. Hence in his interest you must not be content with mere union, but with nothing short of the best union that is possible in the circumstances.

I speak feelingly, because during the greater part of my professional life I have had to work without X-rays, and I know the difference it makes to the results, however painstaking one may be.

In Calcutta we are not so badly off for X-ray centres, if men would only appreciate the importance of using them.

In the *mofussil* matters are different and it is difficult to see how facilities for X-ray diagnosis and guidance can be procured unless the local hospital committees will strive to provide the apparatus in their institutions. A certain amount of the maintenance cost could be recovered by charging fees for examinations where people are able to pay.

(2) Regarding the restoration of the bony deformity, Hey Groves remarks that the setting of a fracture is a myth. I take it that he means it is seldom possible to get the two ends so accurately fitted to one another as to stop in position merely by clapping lateral splints on them. The chief force acting for recurrence of the displacement is the tension of the muscles of the area involved. The old idea which it is hard to eradicate was that once set, only gross carelessness would reproduce the deformity. It is necessary to get rid of this idea. To take a simple example of an oblique fracture of the femur. On an operating table, particularly with an anæsthetic, you may pull on the lower fragment and get it down so that the two fractured surfaces are in apposition, but the moment you let go, the tension of the thigh muscles will cause the two fragments to slide on one another and the fracture surfaces will at once part company. So Hey Groves prefers to talk of the first stage of treatment as restitution of the bony deformity. This is a very important step, which in my experience is not always appreciated and the success of which cannot be tested without a skiagram. For instance, again take an oblique fracture of the femur. The lower fragment may be pulled upon till the length is correct and extension applied which keeps the length correct and yet the fractured surfaces may be turned away from each other, which clearly will not give a satisfactory result. I would emphasise that this part of the treatment must not be slurred over and that generally anæsthesia is necessary to carry it out efficiently.

(3) The third instruction is that the retention of this restored position must be maintained. In some cases this retention does not involve any apparatus. For instance, in most cases of Colles fracture restoration of the bony deformity having been obtained, the fragments do not slip again if handled with reasonable care. In many other fractures (perhaps in the majority) extension to overcome the muscle tension will do what is required, while in others nothing but operation will restore the broken ends into the necessary relationship to one another.

It is important to appreciate that indications for particular treatment have changed. Formerly we were taught that all fractures of a particular site were to be treated identically.

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This is no longer the case. It is not a case of using extension for all fractures of the tibia and operation for all fractures of the thigh. The point is to overcome the muscle tension by the least drastic method applicable in the individual case. In some cases massage will be sufficient, in the majority extension will do it, while in a few mechanical fixation of fragments will be necessary. The criterion for mechanical fixation is a skiagram taken 6 to 8 days after restoration of the bony deformity. If the necessary position be not maintained, operation should not be delayed. Obviously experience must shew more and more in what sites operations are most frequently required.

I am not sufficiently versed in the subject to know what the latest general experience is, but from our own experience it seems that one can usually get good results by extension on the tibia, but nothing like as good results with the femur, except in children.

(4) The fourth instruction is the preservation of the vigour of the muscles and circulation from the outset by early movements. Here again one often sees the results of neglect prevailing, either because the doctor does not really believe in the advantage of it or is not prepared to devote the necessary time and care to it. The intelligent co-operation of the patient is here a tremendous asset.

There are three methods involved, namely, massage, passive movement and active movement. Massage, of course, does not consist of pommelling or kneading the part, but consists of a gentle light stroking of the muscles from below upwards over the site of the fracture, maintained for about ten minutes at a time. This should be started from the beginning and maintained regularly in all simple fractures because it diminishes the spasm of the muscles and so diminishes the resistance to restoration of the bony deformity, soothes pain and accelerates the disappearance of œdema from the soft parts. Passive movement, it is generally held, does not amount to much. It is certainly not nearly so effective as active movement, but still it has its uses, it often fills a gap till active movements are possible. The object of movement is to aid the restoration of the circulation and so get rid of inflammatory products which would make for adhesions later on. The introduction of active movements may have to be delayed for two reasons. (1) The surgeon may consider that early active movement is likely to disturb the restoration of the deformity. (2) The patient may be so unintelligent that he cannot be persuaded to make the active movements which the surgeon wants. In these circumstances, passive movements have their rôle and the point to remember in making them is that their range must be limited to what the patient can bear without pain. This range is found to be more extensive if the passive movements immediately follow the gentle stroking movement which has been called massage.

Everything is to be gained by early active movement so long as it does not actually displace the two fractured surfaces. The fact that early active movement may cause slight friction of the two broken surfaces upon one another is not detrimental. It seems to me that this early active movement is the keystone of the modern treatment of fractures. It is this which obviates the long and tedious convalescence required in the old days of immobilisation.

Nowadays when the fracture is united, a further period of graduated exercises is required for the union to get strong enough to enable the limb to be used to its full extent, but no time is lost on overcoming stiffness and adhesions which should not have been allowed to form.

Obviously in dealing with a Colles fracture active movements can be started early, letting the patient bend the wrist backwards and forwards, opening and closing the hands, but in dealing with a thigh you cannot have the patient attempt to lift the leg as the strain would certainly displace the fragments, but even here it is possible to teach the patient to contract gently and relax the vastus muscles without actually accomplishing movement of the leg. Movements of the toes and ankles can be encouraged, though early active movement of the knee must be deferred.

(5) The last instruction is early restitution of functional utility by graduated exercises. This is a matter of common sense. Passing from gentle active movement to complete flexion of the joints, in the case of a leg, the first stage will be carried out while the patient lies horizontal in bed, and will consist of flexing the knee and ankle and thigh by raising himself to a sitting position in bed, later by dangling his legs over the edge of the bed, then by lying flat and lifting the leg entirely away from the bed. Later the patient must have a patten made for the sound foot and learn to walk with crutches, swinging his injured leg free of the ground. Then we teach him to crawl round his bed with most of his weigh, on his hands, but putting the injured limb to the ground at every step and gradually putting more weight on it as he gains confidence. After a few days thus he can get on his crutches again without a patten and work his way about the wards, putting the injured leg to the ground at every step. A time soon comes when he can afford to discard one crutch and later to substitute a walking stick for the other crutch, and thereafter he may be left to himself to complete his cure.

In my experience, the rate of progress made by different patients with similar fractures varies largely with the intelligence of the patient. A man who is keen will quickly tumble to the idea and work out his own salvation, while a dull man has to be driven to every succeeding step and is ready for the road at a much later date.

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Before closing, I wish to emphasise a few points regarding *compound fractures*.

All compound fractures are potentially septic cases. We have selected particulars of 39 compound fractures treated in the Sambhu Nath Pundit Hospital. Of these 23 were cured before leaving hospital, 8 were discharged otherwise, and 8 died. Those 23 cured include 2 amputations which may be called secondary. Thus of the 39, 6 died of shock, leaving 33. Of the 33, 6 were discharged on request long before treatment was completed, leaving 27. Amongst these, sepsis more or less defeated us in 5 cases: one man died of sepsis, two were discharged otherwise, having wearied of our efforts to check long continued sepsis, and 2 required amputation on account of sepsis.

I do not know how these figures compare with other hospitals in the city, but I am sure they are capable of improvement.

In compound fractures the defeat of sepsis is the primary consideration, the apposition of the fragments is of quite secondary importance. This means that when occasion arises to give first aid to a case of compound fracture, every doctor ought to be alive to the necessity for cleansing the surrounding skin, for fixing the limb so that no further movement of the parts can take place pending arrival in hospital. In hospital it means an immediate thorough operation which cannot be done without an anæsthetic.

The necessary steps are:—

(*i*) Cleanse the skin.

(*ii*) Excise the edges of the wound, both skin and subcutaneous tissues.

(*iii*) Excise from the muscles and fascia and periosteum all dirty and severely damaged tissue.

(*iv*) Examine the ends of the bone so that these also may have dirty portions nipped or sawn off.

(*v*) Swab the parts out with an efficient antiseptic.

(*vi*) Keep the wound soaked in sodii hypochlorite in some form and do not worry about restoration of bony deformity until after the third day, when you are sure that you have defeated sepsis.

NOTES ON MALARIA IN HILL-STATIONS IN OR NEAR THE EASTERN HIMALAYAS.

By C. STRICKLAND, M.A., B.Ch.,

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THESE notes are a symposium from three papers by Shortt (1924), McCombie Young (1924) and the present writer (1924), the first two dealing with Shillong, the third the neighbourhood of Kurseong.

In both these places the authors have concluded that *Anopheles maculatus* is mainly culpable, so that the differences in the incidence of the disease which have been reported are interesting and the explanation instructive. The incidence of the epidemic in Kurseong is from April to July inclusive, while in Shillong it is from the middle of May to the middle of October.

The Onset of the Epidemic.

This being earlier in Kurseong than in Shillong, may be accounted for either by the possibility that in Shillong *maculatus*, owing perhaps to climatic considerations, is practically non-existent until April (as is stated by McCombie Young) while it can be found in Kurseong all through the cold weather; or that, granted it is present in the early months in Shillong, some conditions there, perhaps meteorological, preclude the development of the malaria parasite in the mosquito until a later date than in Kurseong.

Shillong lies at about 6,000 feet as against 3,500 feet at Kurseong where the observations were made and as *maculatus* is to be found throughout the cold weather at Kurseong, it appears likely that it can also be found in Shillong before April, so that probably the reason for the difference in the two places in the time of onset of the epidemic is not so much because of a difference in the number of mosquitoes, as in the conditions, probably meteorological, which influence the development of the parasite in the mosquito.

The Duration and Termination of the Epidemic.

The epidemic incidence is of rather short duration in Kurseong, lasting from April to July inclusive, while in Shillong it lasts longer, from the middle of May to the middle of October.

The difference probably depends ultimately on the different geological structure of the two tracts. Kurseong lies on the Himalayan foot-hills, Shillong lies on rocks which are characteristic of peninsular India; the correlated physical features of the two tracts being distinct; Kurseong hills are scarred with rough stony ravines and nullahs, whilst the Shillong hills have valley beds of rich lush soil on which paddy is grown.

Apparently at Kurseong as soon as the rains break all the stream-breeding anophelines are washed away, they can get no foothold elsewhere, and malaria abates by crisis, while in Shillong, so it is stated, when the rocky nullahs are scoured out, *maculatus* is found in the swamps and rice fields in the valleys at the foot of the step hills, and thence carry on their harmful work till the onset of the cold weather, when the epidemic gradually subsides.

McCombie Young believes that early heavy rains have a potent effect in modifying the severity of the annual epidemic in Shillong, as the writer concluded was the case in

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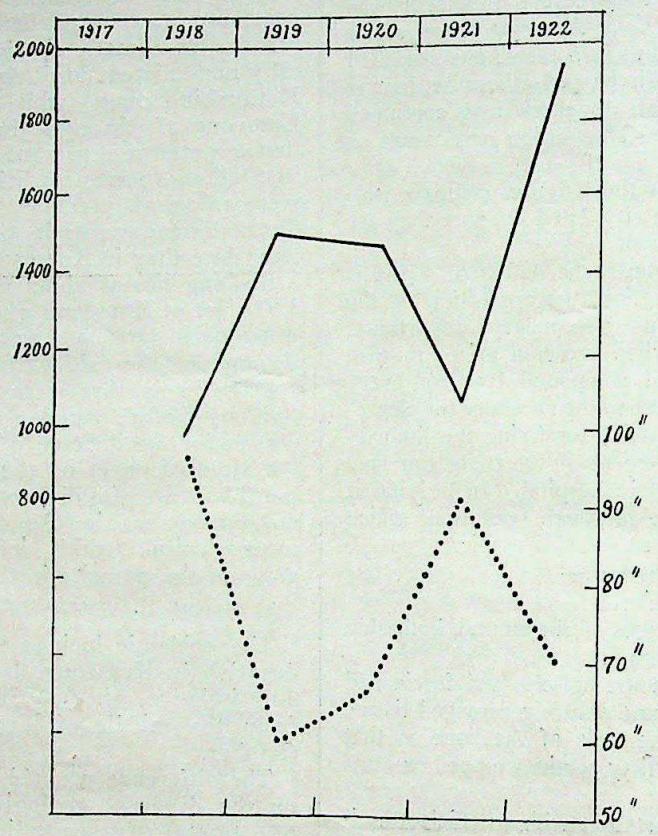
Kurseong. Nevertheless, the factor which appears to be of prime importance is the severity of the monsoon of the *previous* year. The writer has charted the incidence of malaria cases at the Civil Dispensary each year from 1918 to 1922 against the rainfall for the previous year, and the inverse correlation is perfect (*vide* Chart).

SHILLONG.



Malaria ———
Rainfall Previous Year. ....

Prevention of Malaria.

The writer, while on a visit to Shillong, had the pleasure of accompanying Colonel McCombie Young round some of the malariagenic terrain there, and pointing out that the correct way to drain the *maculatus*-ridden swamps in the shallow valleys of the station is by a system of hill-foot contour drains, a system largely used by Watson in Malaya, who in his turn had it from a planter Mr. Carey, instead of by the really harmful central drain which had been previously instituted.

While one often sees attempts at drainage of the land for economic if not for hygienic purposes, one rarely sees it correctly done, so that the point cannot be too strongly insisted on.

The writer does not agree with McCombie Young in stating that personal prophylaxis is probably more important in Shillong than engineering works. The police and indigenous population are not likely to indulge in the former, and the European and Indian visitors if not the high officials, would probably prefer to live in an atmosphere unvitiated by joss-sticks, katol, and citronella oil, or by excessive carbon dioxide inside a mosquito net.

Moreover engineering works which would reduce the malaria in Shillong a great deal would not be costly unless a system of subsoil drains be laid down. All that would be necessary is a system of contour hill-foot drains, and as *maculatus* will breed in these as well as in the swamps, the drains must have either subsoil pipes laid in them, or a ribbon of jungle allowed to grow up over them which will prevent *maculatus* breeding in them. If rubble be laid in such drains, as is sometimes suggested, the effects are likely to be disastrous.

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THE RELATIVE VALUE OF DIAGNOSTIC METHODS, AND EVIDENCE OF CURE IN KALA-AZAR.*

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In a recent publication Knowles, Napier and Gupta (1923) gave a list of the methods used in the diagnosis of kala-azar in what they considered to be the order of relative reliability.

The order given by them is so considerably at variance with the writer's experience that it forms the reason for the present paper. Where the results of the experience of different workers vary so widely, it seems only reasonable that the points of view of each should be equally set forth, in order that the further experience of others may eventually lead to a general agreement as regards the relative value of the methods which will be accepted by a majority of workers. In the publication previously referred to, the diagnostic methods discussed are seven in number, and these only will be considered. A list of these methods is given below in the order of relative reliability which has been suggested by the present writer's experience under both hospital and field conditions. To render comparison easy, following each method there is a Roman numeral representing its order in the list prepared by Knowles, Napier, and Gupta.

1. Culture of spleen puncture fluid on N.N.N.—I.
2. Culture of liver puncture fluid on N.N.N.—IV.
3. Culture of the peripheral blood by Row's method on N.N.N.—II.
4. Examination of spleen puncture films; no cultures taken—III.
5. Examination of liver puncture films; no cultures taken—VI.
6. The aldehyde reaction—V.
7. Examination of peripheral blood films; no cultures taken—VII.

It will be seen from this list that the three methods in which a cultural technique is utilised are placed first, an acknowledgment of the great delicacy of cultural methods in detecting the presence of *Herpetomonas donovani*. The most important point of difference in the two lists is the prominence given in the present list to culture of liver puncture fluid in N.N.N., by putting this method in the second place, whereas in Knowles, Napier and Gupta's list it is accorded the lowly fourth position. This lowly position is in accord with the similar lowly position occupied in their list by microscopical examination of liver puncture films. This is quite inexplicable to the present writer, whose experience has been that the results of liver puncture are very little if at all inferior to those of spleen puncture. Although I have been unable to find the reference, I believe this is also the view taken by Elwes, as a result of his experience in Madras.

In this connection it seems that an even fairer classification of the methods described would have been to make only five methods, by the combination of methods 1 and 2 as being equally efficient, under one heading, and also of 4 and 5 under one heading, since, in the author's experience where either of the units in these pairs is positive the other is also invariably positive. The amended list would then read as follows:—

1. Culture of spleen or liver puncture fluid on N.N.N.
2. Culture of the peripheral blood by Row's method or on N.N.N.
3. Examination of spleen or liver puncture films; no cultures taken.
4. The aldehyde reaction.
5. Examination of peripheral blood films; no cultures taken.

Evidence of Cure in Kala-Azar.

This question of course is intimately bound up with that of diagnostic procedures. The problem for solution in any individual case is presumably whether the patient in question can be pronounced cured or not, the term "cure" signifying the complete absence of any viable forms of *Herpetomonas donovani* capable of multiplying and so leading to a relapse. To the uninitiated it would seem that the procedures utilised for diagnosis would be applicable in the order of relative reliability in which they were placed for original diagnostic purposes. This is found not to be the case since treatment, even when the case is not yet cured, is found to exert a profound influence on the relative efficacy of the usual diagnostic procedures. It must be remembered that in a case which is nearly cured the parasites are relatively very few in number and the chances of finding them by ordinary microscopic methods are reduced practically to the vanishing point. In other words, if parasites are still to be found by microscopical methods alone, the case is not nearly cured and the question does not arise. Similarly, the aldehyde reaction does not help us as it may still be positive. One is reduced, then, to the employment of those procedures only in which cultural methods are utilised. If one examines the original list of diagnostic methods it will be seen that there are three of these; viz., cultures of splenic material, liver material, and peripheral blood. Of these three methods the last, culture of the peripheral blood, may be said to be of very doubtful value. Even in cases where parasites in the peripheral blood are relatively numerous, these rapidly disappear under treatment, and by the time treatment has been prolonged and the case is nearing cure, the recovery of parasites from the peripheral blood, although they may still be present in the internal organs, would be an

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unusual occurrence. For this reason culture of the peripheral blood as an evidence of cure in any individual case carries little weight in the event of a negative finding. Young and Van Sant (1923) in their work corraborate these views.

Of the remaining two methods,—culture of splenic material and of liver material,—the writer's experience has been that there is little or nothing to choose between them. In many cases when cure is nearly complete the spleen may have disappeared above the costal margin, making it less convenient, although perfectly feasible, to effect a puncture. In such a case culture of the material obtained from liver puncture may be absolutely relied on to give a result as definite as that obtained from a splenic puncture, and I have yet to meet the case in which the one organ gave a different result from the other. This fact is of more importance when the question is one of cure than when it is merely one of initial diagnosis, since in the latter case it is probable that the spleen is easily palpable. Where however, the latter is small, only slightly presenting, or very movable, or if the patient is a young or nervous child who is likely to move during the operation, liver puncture is the preferable procedure and may be relied on to give a definite result. One point which may be mentioned in connection with the stage arrived at in a case where the parasites have been reduced, as the result of treatment, to very small numbers, is that such cases appear sometimes to completely recover without further treatment. *It seems as though the number of parasites had been so reduced that the greatly raised resistance of the body, the result of improved nutrition and of amelioration of the blood system, was sufficient to destroy the few remaining parasites without the adventitious aid of further direct therapeutic measures.* In conclusion, I would emphasise again, as I have done in previous publications, the very great importance of using a really efficient medium in all cultural procedures. The certainty of detecting very slight infections depends chiefly upon this point, and an inefficient medium is worse than useless in that it sometimes encourages false hopes of cure.

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SOME OBSERVATIONS ON THE CHOLERA EPIDEMIC IN BOMBAY, 1923.

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BOMBAY being a great commercial centre and the largest port in the East, is always liable to have various infectious diseases introduced from other countries. Besides being the gate-way of India, it is also a gate-way of infection for India. This has been repeatedly proved by the admission into this country of such diseases as plague, influenza, etc., during the last few years through Bombay. But the opposite is the case with cholera, as it is mostly introduced into this city from other parts of India such as Lower Bengal, Pandharpur, Nasik and such places, where cholera is always hanging about, and flares up any time under favourable epidemiological conditions and when large numbers of people are collected during various fairs.

The epidemic in 1923 started in June amongst Haj pilgrims who came in large numbers from the Bengal side to go to Mecca. They were mostly aged and infirm, and could not withstand the severe toxæmia, and their case mortality was very high, viz., 58 per cent. No sooner were the cases diagnosed bacteriologically than almost all contacts were inoculated with cholera vaccine by the health authorities and so the epidemic amongst them stopped after two weeks. But after a week or so a local focus of infection revealed itself in a particular street of the city from which as many as twenty-five cases were admitted into the hospital. It seems that the infection was introduced into a house in this street where there were many Goanese cooks, butlers, etc., living in a crowded condition. From this house alone about twenty cases were admitted. The epidemic spread to the neighbouring parts in this locality mainly through fingers, food and flies, and in all 151 cases were admitted to the hospital during July and August. Then it practically died out. Seeing that most of the cases came from only certain localised parts of the city around the above named centre of infection, one can see that it was not a water-borne epidemic. The other parts of the city where there was the same water supply were hardly affected as will be seen from the following table.

Table showing the admissions from the various parts of the city.

Ward.	June.	July.	August.	TOTAL.
A	1	7	2	10
B	0	2	4	6
C	28	39	19	86
D	0	9	7	16
E	2	4	5	11
F	0	2	5	7
Miscellaneous	0	31	15	46
TOTAL ...	31	94	57	182

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Clinical features.

The majority of the cases showed the typical clinical symptoms of cholera; viz. diarrhœa, rice-water stools, vomiting, cramps, collapse and suppression of urine. Later on after-treatment reaction in the way of hyper-pyrexia was shown by some; some cases passed into the uræmic stage. The number of cases admitted in various stages were as follows:—

Classification.	Total admissions.	Deaths.
I.—Diarrhœa ...	8[illegible]	7
II.—Collapse ...	54	30
III.—Reaction and uræmia.	28	9
IV.—Arrived and died	12	12
TOTAL ...	182	58

Diagnosis.

Films from almost all the stools were examined for cholera vibrios and in doubtful cases cultures were made in peptone water and tested for the indol reaction. The following table shows the results of these examinations:—

Cholera Vibrios.	Bacteriological Examination of Stools.			
	June.	July.	August.	TOTAL.
Present in ...	26	64	39	129
Absent in ...	1	10	13	24
Doubtful in ...	4	20	5	29
TOTAL ...	31	94	57	182

Prognosis.

The mortality in these hospitals in previous epidemics varied from 50 to 60 per cent. up to 1921. By the adoption of the treatment outlined below it was reduced to 31.8 per cent. It is possible to reduce it still further if the cases are sent early to the hospital. Amongst Haj pilgrims it was 58 per cent., as most of them were aged and infirm, but in the local cases it was only 26 per cent.

Table showing the percentage of mortality.

Month.	Total admissions.	Deaths.	Mortality %
June ..	31	18	58
July ..	94	29	30
August ..	57	11	19
TOTAL ..	182	58	31·8

Treatment.

Almost all the cases were treated on the lines adopted by Sir Leonard Rogers. Sterile flasks of hypertonic saline, glucose solution, sterilised powders of sodium bicarb. and a number of intravenous apparatuses were kept ready. Soon after the admission of a patient, a thorough rectal saline wash was given and a part of the washed out fluid was sent for bacteriological examination to the laboratory. Also the rectal saline was continued and if the patient was collapsing, he was given direct intravenous saline and alkaline injection by the assistants. As many as 253 intravenous injections were required during this epidemic, and the number of patients injected was 132, showing that the nature of the epidemic was not mild at all. It was necessary to cut the vein open in only half a dozen cases.

The following routine instructions were issued to be observed by the assistants and the nurses in the wards:—

"All the pulseless and collapsed patients (blood pressure below 70 mm. of mercury) should be given one to three pints (according to age and weight) of hypertonic saline and ½ to 1 pint of alkaline saline (add. pulv. sod. bicarb. kept ready) intravenously, to be repeated in 4 to 6 hours if they do not revive or collapse again. If they revive, further rectal alkaline saline 1 pint 2 to 4 hourly is to be continued till there is a free secretion of urine, i.e., about 2 pints in 24 hours.

Medical treatment.

Pill Pot. Permanganate gr. ii—2 every ½ hour; 8 pills; 2 every 1 hour; 8 pills more, till the stools are greenish and coloured.

Next 24 hours 8 more, 2 every 2 hours.

Injection of atropine 1|100 gr. morning and evening.

Kaolin emulsion 1 oz. two hourly and pulv. chloretone gr. 7½ for vomiting and hiccough.

Later on for urine secretion fomentations over the loins; Mist. Alkalina diuretic 4 hourly; injections of pituitrin; intravenous saline and glucose 2 per cent., or rectal saline and glucose 5 per cent."

Although the above was the routine, individual cases were considered on their merits and treatment varied according to their requirements.

Formula of *Rectal Saline:*—

Sodi bicarb. ..	.. gr. 160
Sodi chloride	„ 90
Aqua ad.	pint. 1

Every two hours, or later 4 hourly in the reaction stage.

Formula for *Intravenous Saline:*—

Sodi chloride	gr. 120
Calcii chloride	„ 4
Aqua ad.	Pint 1

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To make alkaline intravenous saline, soda bicarb. (sterile powders) to be added to the above.

A review of some of the cases in the uræmic and reaction stages.

Case I.—(Uræmia). Patient B. P., male, aged 18, was admitted in the collapse stage of cholera. With the usual treatment, he was given two intravenous injections of saline, 2 pints, and alkaline saline, 1 pint, which revived him. Then he developed hiccough, remained drowsy and delirious and passed but a small quantity of urine.

On the ninth day his temperature went up to 102.5° with rigors, he passed urine in bed and was given intravenous saline 2 pints with alkaline 1 pint again. Thereafter his quantity of urine increased, his general condition improved and he was discharged cured.

Case II.—(Uræmia).—Patient, W. N., male, aged 26, admitted six hours after the onset of cholera symptoms with cramps, collapse and suppression of urine. With the usual treatment, three intravenous injections were given six hourly for the collapse and the patient revived after each injection. On the next morning he passed but very little concentrated urine, he perspired freely, and his extremities became cold. His condition remained the same for the whole day and he developed hiccough. Two subcutaneous injections of saline were given, but on the third day he passed into the uræmic stage. He looked much exhausted, became unconscious and passed only two ounces of urine. On the fifth day he became worse and did not pass urine even after intravenous saline injections and other measures to start the flow of urine, and died.

Case III.—(Sepsis and Parotitis). Patient, M. P., male, aged 12 was admitted with cramps and collapse and suppression of urine. He was given two subcutaneous saline injections at an interval of four hours. At night he vomited several times. Next day his body was warm, extremities cold, pulse fast and stools slightly changed but he did not pass urine. One intravenous saline, ½ pint, with alkaline ½ pint, was given. Then on the third day he passed 12 ozs. of urine, the colour of the stools changed to brownish, and condition improved, but on the fifth day there was a relapse and he collapsed and passed only 8 ozs. of urine. He was given intravenous saline, 1 pint, with alkaline 1 pint, after which the quantity of urine increased gradually day after day. He then developed symptoms of bronchitis and sepsis; boils appeared on the thighs and he developed parotitis. The temperature became hectic, the parotids suppurated and were incised, and there was a discharge of pus from the ears, but he eventually recovered.

Case IV.—(Uræmia). Patient, H. V., female, aged 22, 6 months pregnant, was admitted with cramps in the muscles and collapse. Intravenous saline with alkaline was given. Next day she passed very little urine in the bed, the pulse was weak and she was restless, so intravenous saline and alkaline was continued. Still on the third day she passed only 2 ozs. of urine and collapsed, so intravenous saline and alkali with glucose was given again. She delivered a still-born male child at noon. Then the quantity of urine increased and her general condition improved but she complained of pain in the abdomen and the temperature went up to 100.8°; but later on she passed urine freely, her general condition became good and she was discharged.

Case V.—(Typhoid reaction). Patient, M. F., male, aged 13, was admitted with cramps in the muscles, collapse and suppression of urine. Vomiting was continuous and he vomited one round-worm. After subcutaneous saline injection he became quiet, passed 9 ozs. of urine and the pulse improved. Next day he was injected subcutaneously, and the pulse and stools improved. On the fourth day he passed 29 ozs. of urine. Then for two days his condition improved, and he passed urine freely, but he complained of pain and distension of the abdomen. He had diarrhœa and the stools were like peasoup. The Widal reaction was negative, the temperature was irregular and signs of bronchitis appeared in both lungs, which cleared up slowly. The intestinal symptoms also disappeared and he was discharged cured.

Case VI.—(Pregnancy). Patient, V. M., female, aged 27, six months pregnant was admitted with symptoms of cholera and suppression of urine. Subcutaneous saline, 1 pint, injected. Next day intravenous saline and alkaline, 2 pints, with glucose was given for collapse. On the third day she collapsed again with severe pains in the abdomen and her blood pressure was 70 mm. of mercury. On examination no fœtal heart sounds were heard and the presentation was a vertex one. The vein at the bend of the elbow was cut down upon and intravenous saline and alkaline with glucose was started and she was delivered of a dead child by performing version. In all she had about 7 pints of saline and glucose solution. She improved and was discharged later on.

NOTES ON A FEW CASES OF CHOLERA TREATED BY VARIOUS METHODS OF TREATMENT.

By SACHINDRA NATH CHATTERJEE, L.M.P.

Motipur, Muzafferpur District.

On going through the October 1921 copy of the *Indian Medical Gazette*, p. 384, I made up my mind to use kaolin in cases of cholera, this being a very suitable method of treatment in village practice. I kept some kaolin in stock and decided to keep a record of the results of the cases treated with it whenever I got opportunity.

Again, I saw an interesting column in the December 1922 copy of the *Indian Medical Gazette*, p. 474, about the use of essential oils in cholera cases. Later on, I also found an interesting article in the June 1923 issue of the *Indian Medical Gazette*, p. 257, by Dr. Tomb which gives a very suitable method of administering these oils. Then again I came across another report in the *Indian Medical Gazette* for May 1924, p. 233, on the "Efficacy of the Essential Oils" by Dr. Tomb. Just then there was an outbreak of cholera under my jurisdiction here (Baruraj Thana). I began to use kaolin and the essential oils' mixture side by side in alternate cases as an experiment. Subsequently I received a circular from my Civil Surgeon instructing me to use kaolin, which I had started already. I decided to keep a record of cases treated by various methods of treatment in tabulated form with the object of finding out the most suitable remedy which could be easily adopted in villages and could safely be entrusted to the hands of mostly illiterate villagers. I brought the matter to the notice of my superior authorities through Dr. S. K. Chowdhary, M.B., Inspector, Cholera Epidemic, who made a note of it and encouraged me highly.

With the help of my brother officer Dr. S. R. Ghosh, on epidemic duty in my *elaka*, I worked and found that it is always a matter of

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great difficulty to get to know of a cholera case in villages just at the onset, as the villagers always try to conceal an attack at the beginning on grounds of superstition. Moreover, the villages affected being situated at a great distance from the dispensary, prompt medical aid becomes rather difficult. There being no indoor accommodation in the dispensary, treatment of cases from the very beginning to the end under careful and close observation becomes impracticable. Still we have made every effort to do so and after a good deal of trouble we have succeeded in securing some cases which have been treated under close observation and are as tabulated below:—

TABLE I.

Kaolin.

Name, age, sex and religion.	Village.	Condition of patient when received for treatment.	Treatment.	Effect upon symptoms.	Complications and their treatment.	Result.	REMARKS.
(1) Keshbar, 20, H.M.	Junada ..	Commencing collapse, 3 hours after attack.	According to Col. Ross's instruction to use viz., 2 drs. of kaolin in 1½ *chittack* of water, repeated every ½ hour for 4 hours.	Vomiting and purging checked after 3 hours.	Retention of urine; mustard plaster given on kidney region. Hiccough; mustard plaster on pit of stomach and other treatment.	Died.	
(2) Kosalia, 19, H.F.	Narwara	Early stage, after 2 hours of attack.	Do.	Vomiting and purging stopped in 4 hours.	Retention of urine treated as above.	Cured.	
(3) M. L. Ishak, 37, M.M.	Gopinathpur.	At collapse stage 6 hours after attack.	Do.	No effect.	Nil.	Died.	
(4) Khakhar Nunia, 30, H.M.	Baruraj.	Early stage, after 2 hours of attack.	Do.	Vomiting and purging stopped 1½ hours.	Nil.	Cured.	Cured 3 Died 3
(5) Golam Mh., 27, M.M.	Gahumachak.	Commencing collapse after 2 hours of attack.	Do	Vomiting and purging checked after 4 hours.	Retention of urine and hiccough; treated as above.	Died.	Total 6
(6) Dular Gope, 25, H.M.	Purani Motipur.	Early stage, after 2 hours of attack.	Do.	Everything checked in 2 hours.	Nil.	Cured.	All cured cases received at early stage.

TABLE II.

Kaolin and Permanganate.

(1) Bhagala Goala, 20, H.M.	Chowkia	Early stage, after 4 hours of attack.	Pot. permg. pill 2 grs., each every ½ hour and kaolin 1 dr. to 1 oz. of water to drink when he likes to sip and drink frequently.	Every symptom checked after 3 hours.	Nil.	Cured.	
(2) Girbal Singh, 10, H.M.	Ratanpura	Collapse stage, after 10 hours of attack.	Do.	Every symptom checked after 4 hours.	Retention of urine, mustard plaster and diuretic given.	Cured.	Cured .. 5
(3) Nauki Kaharin, 50, H.F.	Koai ..	Collapse stage, after 12 hours of attack.	Do.	Every symptom checked after 6 hours	Nil.	Cured.	Died .. 1
(4) Ramjoti Kumar, 45, H.F.	Narwara	Collapse stage, after 10 hours of attack.	Do.	All checked in 4 hours.	Nil.	Cured.	Total .. 6
(5) Sukhi Goala, 20, H.M.	Koai ..	Collapse stage after 12 hours of attack.	Do.	All checked in 6 hours.	Retention of urine treated as above.	Died.	Amongst cured received— Early .. 2
(6) Agnu Singh, 49, H.M.	Chowkia	Commencing collapse after 3 hours of attack.	Do.	All symptoms checked in 4 hours.	Retention of urine treated as above.	Cured.	Late .. 3 Total .. 5

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TABLE III.

Essential Oils' Mixture.

Name, age, sex and religion.	Village.	Condition of patient when received for treatment.	Treatment.	Effect upon symptoms.	Complications and their treatment.	Result.	REMARKS.
(1) Harnandan Goala, 20, H.M.	Sandha Domar.	Collapse stage after 6 hours of attack.	According to Dr. Tomb's formula.	All symptoms checked after 5 hours.	Retention of urine; treated accordingly.	Died.	
(2) Patia, 7, H.F.	Bakhra ..	Early stage within 3 hours of attack.	Do.	All symptoms checked in 5 hours.	Nil.	Cured.	
(3) Mahanga Kumhar, 20, H.M.	Sandha Domar.	Collapse stage, after 3 hours of attack.	Do.	No effect ..	Nil.	Died.	
(4) Domharu's son, 4, H.M.	Motipur..	Collapse stage, after 12 hours of attack.	Do.	All symptoms checked in 6 hours.	Retention of urine; treated accordingly.	Died.	Cured .. 2 Died .. 4 Total 6
(5) Rampatia, 25, H.F.	Baruraj ..	Early stage, 4 hours afer attack.	Do.	All symptoms checked in 4 hours.	Nil.	Cured.	
(6) Harkhit Kumhar, 49, H.M.	Mahana ..	Collapse stage, after 6 hours of attack.	Do.	All symptoms checked in 6 hours.	Hyperpyrexia and delirium.	Died.	All cured cases received at an early stage.

TABLE IV.

Essential Oils and Permanganate.

(1) Sunder, 10, H.M.	Motipore	In commencing collapse after 4 hours of attack.	Dr. Tomb's formula to take and permanganate of potash to drink (pink coloured solution).	All symptoms checked in 3 hours of attack.	Hiccough; treated accordingly.	Cured.	
(2) Rampeary Kumar, 39, H.F.	Musahari	Collapse stage, after 8 hours of attack.	Do.	All checked in 4 hours.	Nil.	Cured.	
(3) 25, H.F.	Baruraj, Sahitolla.	In early stage 4 hours after attack.	Do.	All symptoms checked in 4 hours.	Nil.	Cured.	
(4) Lakhan Kumhar, 7, H.M.	Nayatola..	Collapse stage, after 6 hours of attack.	Do.	All checked in 6 hours.	Hyperpyrexia and delirium; treated accordingly.	Died.	Cured .. 3 Died .. 3 Total 6
(5) Rama Kumhar, 14, H.M.	Do.	Collapse stage, after 6 hours of attack.	Do.	No effect ..	Nil.	Died.	Amongst cured cases received—
(6) Nathuni Goala, 35, H.M.	Sundarsarai.	Collapse stage, after 8 hours of attack.	Do.	Checked after 9 hours.	Tympanites, retention of urine; treated accordingly.	Died.	Early .. 2 Late .. 1 Total 3

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TABLE V.

Rogers' Treatment.

Name, age, sex and religion.	Village.	Condition of patient when received for treatment.	Treatment.	Effect upon symptoms.	Complications and their treatment.	Result.	REMARKS.
(1) Jai Prasad, 6, H. M.	Jhitkaiah	Collapse stage, after 7 hours of attack.	Pot. Perm. pill calcium, perg. drink, saline intravenous, hypertonic.	All symptoms checked in 7 hours.	Nil.	Cured.	Cured .. 1 Died .. 3 Total .. 4
(2) Kishori Sonarin, 18, H. F.	Birpur ..	Collapse stage, after 6 hours of attack.	Do.	Checked after 8 hours, but relapsed again.	Coma.	Died.	The cured case was received in late stage.
(3) Ramashray Pd., 30, H. M.	Koai ..	Collapse stage, after 10 hours of attack.	Do.	Vomiting stopped in 2 hours but purging continued.	Hyperpyrexia and delirium.	Died.	
(4) Shampatia, 6, H. F.	Sundar-sarai.	Collapse stage, after 8 hours of attack.	Do.	Not checked.	Nil.	Died.	

Total treated, 28 only.

Total cured, 14. Received in early stage, 9 only; late stage, 5 only.
Total died, 14. Do. do. do. 2 only; do. do. 12 only.

Conclusions.

(1) The essential oils mixture, though it has got diuretic properties and some stimulating effect, probably cannot prevent the absorption of toxins either chemically or mechanically and if there be such action it is not sufficiently strong, as is urgently required in these cases; also it is doubtful whether it possesses any bactericidal property.

(2) Kaolin acts in two ways: firstly, it prevents absorption of toxins mechanically by coating the intestinal wall very quickly, which gives an opportunity of treating the complications, if any: secondly, most probably it inhibits the growth of proteolytic bacteria in the bowels and favours the growth of acid-forming bacteria—hence indirectly acting as bactericidal agent.

On account of the above reasons, its cheapness and its simplicity in administration, kaolin is to be preferred to the essential oils.

(3) It seems from the above table that kaolin acts very well when given with permanganate, and permanganate may also be pushed in massive doses even (as there is no chance of poisoning owing to the formation of a coating upon the intestinal wall by kaolin which prevents absorption) without any risk.

In fact *permanganate and kaolin* is one of the most rational and simplest methods of treatment suitable for villages, for *melâs*, and in combating the epidemic, etc.; it is applicable to cholera in all its stages and it is therefore better than the use of kaolin or essential oils alone, as these have proved of service only at the early stage of an attack.

(4) The intravenous injection is a long procedure and cannot be repeated in village practice. It is, however, found that rectal injection of tepid normal saline every 2 to 4 hours according to the urgency of the case, with permanganate pills, sometimes are of more service, but it is also not as practicable as kaolin and permanganate in village use where the majority of the people are illiterate, and also it is almost impossible in the case of female patients. But further experiment is necessary before coming to a final decision that *kaolin and permanganate is the best and easiest method of treating cases of cholera in village practice.*

In conclusion I am extremely grateful to my Civil Surgeon, Major A. H. Napier, I.M.S., for his kind help in the preparation of this report.

A NOTE UPON ROUTINE BLOOD CULTURES.*

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CAPTAIN, I.M.S.,

Professor of Pathology, Calcutta Medical College.

THE routine practice of making a culture of the blood in all febrile cases at or near the

* Being an abstract of a paper read before the Medical Section of the Asiatic Society of Bengal on the 12th March, 1924.

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time of onset of the fever has given us many an interesting result at the Medical College Hospitals during the past three years.

Our method is simple. At first the blood from cases of suspected enteric infections was taken into taurocholate broth, and of others into ordinary broth. Subsequently, as we are fortunately always able to have on hand good supplies of hydrocele and ascitic fluids, we added fifteen per cent. of either of these to glucose broth, so securing a most favourable medium for the cultivation of streptococci. Now our blood cultures are all made simply in flasks containing 50 c.c. of 2 per cent. glucose broth with 1 per cent. sodium citrate.

From an adult ten cubic centimetres of blood are removed and seven are put in this medium. The added blood raises the nutritive

TABLE I.

Streptococcus bacteræmia,	Complicating typhoid fever :—in one *B. typhosus* and streptococci present together. 2 Traumatic. 2	Fever and respiratory catarrh resembling influenza or enteric. 3 Endocarditis. 1	Infection not localised. 4 Transverse myelitis with cystitis. 1	Infections about testes and spermatic cord. 2 Puerperal. 7	Total number of cases. 22
B. pestis bacteræmia.	Occurring without suspicion as no localising signs present. 3		With lymph-adenitis. 2		5
B. coli bacteræmia.	Urinary infections during pregnancy or the puerperium. 6	Associated with primary urinary infections. 7	Urinary infection in convalescence from typhoid. 1	Urinary infection in convalescence from diphtheria. 1	15
Meningococcus bacteræmia.	During typical meningococcus meningitis. 4				4
Pneumococcus bacteræmia.	Without detected pulmonary signs. 7	In lobar pneumonia. 7			14
Staphylococcus bacteræmia.	After infected injury to toe. 1		Associated with endocarditis. 2	Origin not manifest. 1	4
B. influenzæ	Septicæmic case. 1				1
					Total 65

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value of the medium to a satisfactory level at which any of the ordinary bacteria likely to be encountered will grow freely and rapidly.

The remainder of the blood is transferred to a tube and used for the carrying out of agglutination reactions.

During recent months we have obtained the series of "positive" blood cultures shewn in the table on page 558, excluding those in which organisms of the enteric group or flagellates were isolated.

Here I may say that the vigilance of the Clinical Pathologists, Drs. Khan, Chatterjee and Gupta, has been most commendable in securing cultures from febrile cases at the most opportune times. The importance to the clinicians and to the laboratory of the linking clinical pathologists cannot be overestimated.

The table indicates the nature of the bacteria secured in cultures of the blood and the conditions in which they were obtained.

The following findings seem to be of sufficient interest to be specially commented upon:—

(1) Streptococcal bacteræmia complicating typhoid fever. Of these, four cases occurred, in one of which a simultaneous culture of *B. typhosus* and a streptococcus was obtained. Two of them had severe hæmorrhage from the bowels shortly after the blood cultures were secured, but ultimately recovered.

(2) *B. pestis* bacteræmia.

Three cases were of very acute febrile seizures admitted as being of unknown origin. The positive blood cultures revealed their true nature.

In one of the cases with lymphadenitis the affected glands were cervical and there was associated a severe pharyngitis.

(3) Pneumococcus bacteræmia.

In seven of the fourteen cases the clinicians were unable to determine the existence of a localisable pulmonary lesion. The remainder were frank cases of lobar pneumonia.

(4) *B. influenzæ* bacteræmia.

This finding occurred in a case of acute pneumonitis which terminated fatally. The organism isolated from blood culture before and after death was finally decided to be the influenza bacillus owing to its markedly hæmophilic nature. It could not be grown on media other than those containing blood. A post-mortem secured on the following day in a definite case of *B. pestis* infection made this finding of particular interest. We hope to describe these two cases in greater detail at some other time.

The conclusions from these observations are fairly trite.

They undoubtedly emphasise the value to the clinician, from the point of view of exact diagnosis, of routine culture of the blood in febrile illnesses. Such cultures will often clinch a diagnosis already almost certain, elevate a suspicion, and at times again furnish a surprise.

Their interest is also frequently practical, as vaccines made from the organisms isolated have in more than one instance definitely seemed to contribute towards the recovery of the patient.

Finally, the culture medium is a very simple one for general use and one, moreover, in which even refractory bacteria grow most satisfactorily.

A NOTE ON THE CAUSE OF PEMPHIGUS CONTAGIOSUS (MANSON).

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Director,

and

Dr. S. RAMAKRISHNAN,

Civil Assistant Surgeon, King Institute of Preventive Medicine, Guindy, Madras.

THE skin affection described under this name by Manson is very common, especially in children, in Madras during the hot weather. Castellani, in his book on tropical diseases written in conjunction with Chalmers, and in his article on skin diseases in Byam and Archibald's "Practice of Medicine in the Tropics," describes the condition under the name pyosis and names four varieties, *pyosis mansoni, tropica, palmaris* and *corletti*. The particular variety to which we refer fits in most closely with his description of pyosis mansoni. The papular eruption, becoming first vesicular and then rapidly pustular, with the well marked reddish ring and little, if any, crust formation, is the characteristic feature of this condition. In Madras both extremities and, less commonly, the axilla are the most common sites. Contrary to Castellani's experiences elsewhere, the inguinal region is comparatively rarely affected in the Madras cases.

The cause of the affection is variously given by the authors we have mentioned. Manson-Bahr states in general terms that it is due to

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"pyogenic cocci." Castellani describes the constant presence in the fluid of the blisters of a diplococcus, the aurococcus (of Winslow and Rogers, 1905), whose colonies are of a golden yellow colour and which he says is the causal organism. We have examined some hundreds of these cases and agree that this yellow coccus is constantly present, particularly in the later stages, once the contents of the vesicle have become cloudy. In earlier vesicles, however, we have with equal frequency isolated a streptococcus, growing most easily on blood or serum media but also after subculture on agar, which forms a minute clear translucent colony and we look upon this streptococcus to be the primary cause and aurococcus to be a secondary infection occurring in the more mature bullæ. With a view to determining the exact position of this streptococcus, we have lately examined in detail the organisms grown from 24 typical cases of the disease. In each case the streptococcus was found. In smears from the fluid of the blister the organism appears as a small Gram-positive diplococcus. The colonies on serum or agar media are extremely minute, clear, translucent and discrete. They are not soluble in 20 per cent. bile and they do not ferment insulin serum water. They are definitely hæmolytic when grown on human blood agar. All the strains isolated gave identical fermentations in Holman's carbohydrated medium.

Glucose	Lactose	Mannite	Salicin.
+	—	—	—

These fermentations are those of streptococcus subacidus according to Holman's classification. The mere fact that all the cases produced a similar type of organism is strong evidence that the streptococcus in question is the cause of this definite clinical entity. It has long been customary in Madras to treat the affection by means of a vaccine prepared from this organism which has gained considerable local celebrity and is known as the "pemphigus" streptococcus owing to its unfailing powers of cure. The vaccine is administered in doses of 5, 10, 15 and 20 millions at intervals of from four to six days. It is rarely however that the full four doses are required, the condition disappearing after the second or third dose with the greatest regularity.

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THE ALDEHYDE TEST IN *SCHISTOSOMUM HÆMATOBIUM* INFECTION.

By R. B. LAL, M.B., B.S., D.P.H., D.T.M. & H.,

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(Research carried out under the Indian Research Fund Association.)

THE blood of some cases of *Schistosomum hæmatobium* infection, as diagnosed by finding ova in the urine, was available and advantage was taken of this opportunity to observe the aldehyde reaction in this disease. Nineteen cases were examined, all of whom were Mahratta soldiers. None of them gave a history of kala-azar.

Three batches of cases were tested on different dates. As there was some difference in the results of the first batch and those of the subsequent two batches, they are given in the two separate Tables, I and II respectively. In Table II it will be noted that the cases are arranged in the order of the duration of treatment and the amount of tartar emetic administered.

Three methods of the test were employed, one of which, method 1, is exactly the same as that described in a previous communication (Lal, 1923); while the other two slightly differed from the ones used before.

Briefly stated, these methods are:—

Method 1. (As originally proposed by Fox and Mackie, 1921.)

Consisted of putting a drop of serum on a clean slide and inverting it over a watch-glass containing commercial formalin. After five minutes the slide was removed and examined. All cases of opacity and "gel" formation were marked positive.

Method 2. (Modification of Napier, 1922.)

Here instead of four drops of blood being taken directly from the patient's finger at the time of the test, as done by Napier, an equal quantity of previously collected blood was put into a small test tube containing ½ c. c. of citrated saline (Formula: sod. cit. 0.5 grm., sod. chlor. 0.9 grm., and water 100 c. c.). After adding a drop of formalin, it was kept overnight at laboratory temperature. The sign + here employed indicates an opacity equal to the standard tube as described by Brown (1919). In no case was a higher degree of opacity observed; any opacity of a lesser degree was marked ±.

Method 3. The exact technique of Napier (1922) was employed, viz., 1 c. c. of serum was taken and 1/17th c. c. of commercial formalin was added. The signs used in the last column of

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the tables are according to Napier's standards. Here as before, in some cases "gel" formation and opacity did not exactly correspond and Napier's standards could not be employed, a blank space has, therefore, been left in the last column against such cases.

The sera of the first batch were brought from a distance of about two miles, on a September day in the Punjab, without an ice-chest and kept about 24 hours before examination, while in the other cases they were brought in an ice-chest. According to Bassemans and Von Boechel (1922), serum previously exposed to a temperature of 56°C. acquires the property of rapid gelification and it is possible that the difference in results noted above regarding "gel" formation was in some measure due to the heat to which the serum was exposed.

The syphilitic history of these cases could not be ascertained. Cases 1, 3, and 7 in Table II gave histories of malaria (B.T.). Case 1 in Table II had scars of oriental sores. There was, however, no history of dermal leishmaniasis in other cases.

The exact factors determining the reaction could not be ascertained.

The number of cases is too small to allow of any generalizations and it is hoped that other workers more favourably placed will throw greater light on the subject. The facts herein stated, however, are suggestive of :—

(1) The probability of the aldehyde reaction being positive in some cases of *Schistosomum hæmatobium* infection.

(2) Much reliance can not be placed on methods 1 and 2.

(3) The diagnostic value of the aldehyde reaction might become doubtful in places like the Sudan where both kala-azar and *Schistosomum*

TABLE I.

(*Batch* 1.)

Serial No.	Quantity of tartar emetic administered.	Method 1.		Method 2.	Method 3.		Corresponding Napier's Signs.
		Gel formation.	Opacity		Gel formation.	Opacity.	
1	15¼ gr.	Nil	Nil	+	±	±	
2	16¼ gr.	Nil	±	±	±	+	
3	13¼ gr.	Nil	Nil	Nil	+	±	+++
4	20¼ gr.	±	+	±	+	+	+
5	17 gr.	Nil	+	+	+	+	+++

TABLE II.

(*Batches* 2 *and* 3.)

Serial No.	Quantity of tartar emetic administered.	Method 1.		Method 2.	Method 3.		Corresponding Napier's Signs.
		Gel formation.	Opacity.		Gel formation.	Opacity.	
1	2½ gr.	Nil	Nil	+	±	+	
2	3¾ gr.	Nil	Nil	Nil		+	
3	4¾ gr.	Nil	Nil	Nil	Nil	Nil	— ive
4	5¾ gr.	..	..	+	±	Nil	
5	7½ gr.	..	..	..	±	Nil	
6	7½ gr.	..	..	..	±	±	
7	10¾ gr	..	..	Nil	±	Nil	
8	13 gr.	Nil	Nil	Nil	Nil	Nil	— ive
9	13¼ gr.	..	..	+	+		+ + +
10	15¼ gr.	..	..	+	+	+	+ +
11	16½ gr	..	..	Nil	±	Nil	
12	17½ gr.	..	..	Nil	±	±	
13	18¾ gr.	..	..	Nil	Nil	Nil	— ive
14	19½ gr.	..	..	Nil	±	Nil	

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hæmatobium infections prevail, and where in cases of the latter disease complicated with malaria and similar fevers the real issue may be confused if this test be relied upon.

I wish to express my indebtedness to Major J. A. Sinton, V.C., I.M.S., for providing me with the blood of these cases, and for his general advice and suggestions.

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THE USE OF INTRAVENOUS IODINE IN PYÆMIA.

By P. BELL, I.M.D.,

Military Assistant Surgeon, Falam, Chin Hills.

THE patient, I. B., a Hindu male, aged 27 years, is by occupation a muleteer in the Falam, Chin Hills. He was quite well up to the 31st January, 1924. On the 1st February, 1924, he felt giddy, had a rigor followed by fever and pains all over the body. He had a mark on the third knuckle of his right hand which he stated was caused by a prick from a thorn, whilst collecting grass in the jungle three days previous to onset of the disease. This got inflamed and his hand was bad while in hospital, but he did not refer to the part as he was too ill to trouble about it, not attributing any importance whatsoever to such a seemingly slight complaint.

The patient ran an irregular temperature reaching 101° in the evenings. He had swellings above the left knee on its outer side, the right elbow on its inner side, the right hip, and the upper part of the right side of the chest. He stated it hurt him to breathe.

His blood was examined for malarial parasites on the 11th February, 1924. None were found, but the blood showed a marked increase of polynuclear leucocytes which I pointed out to the sub-assistant surgeon who was running the in-patient department at the time. I took over charge on the 12th instant and found the patient in the following condition:—

His features were drawn, with an anxious look, and he was unable to help himself or turn in bed. He stated he felt that he was dying. The swellings already described were hard, unconnected with the several joints or muscles, and were very painful.

I diagnosed the case as one of septic infection, but at the time was unaware of the condition of his knuckle.

13-2-'24.—Tincture of iodine m.v. was administered intravenously. This upset the patient's mind very much and he did not sleep at night. His temperature only rose to 98.8° in the evening, however, after being normal in the morning. The next day it was normal and has been normal since.

15-2-'24.—Tincture of iodine m.vi. administered intravenously. Felt much improved after it and on the 16th was able to sit up in bed.

19-2-'24.—Tincture of iodine m.viii. administered intravenously. After this all pains left him and the swellings subsided except for that on the hip.

In the hopes of this clearing up I administered one more intravenous injection of tincture of iodine m.viii on the 25th, but it had no beneficial effect on the hip. I waited till the morning of the 29th and as there was no improvement (in fact the pain extended down to his ankle), I ran a hypodermic needle into the most painful spot over the hip, and withdrew pure pus.

The patient consented to an immediate operation without chloroform. He was put on the table at once, and under a local anæsthetic (apothesine) I incised the part. The abscess was deep seated. About 2 ozs. of pus was evacuated.

3-3-'24.—He was now convalescent and able to walk about freely. The pain in the leg had disappeared. He was putting on weight rapidly.

To sum up.—The case was one of pyæmia, the abscess in the hip clearing up any doubt on this point. The cause can only be attributed to the thorn prick.

No special preparations were required for the administration of the tincture of iodine. The method adopted was to inject the iodine directly into the vein with a 10 c.c. syringe on every occasion, diluted with 10 c.c. of sterilised rain water.

The rapid improvement of the patient was noteworthy. The injections brought about a marked change in his condition.

The treatment is handier and cheaper than vaccine treatment; it can be obtained in all dispensaries, all that is required is tincture of iodine, a 10 c.c. syringe, rain water and care.

Vaccine treatment is expensive and as a rule is not available when required. If tincture of iodine is given a fair trial in such and similar cases it may eventually replace vacine treatment.

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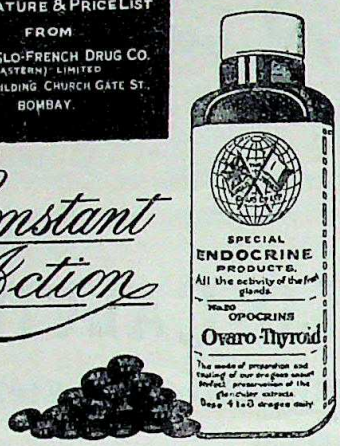

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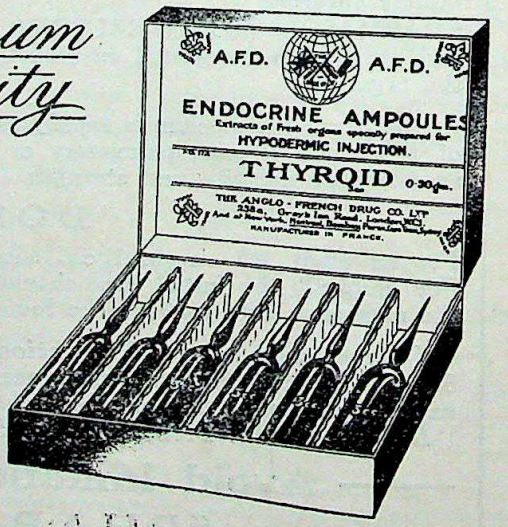

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Indian Medical Gazette.

NOVEMBER.

THE FUTURE OF MEDICINE IN INDIA.

MANY of our readers have perhaps wondered why we have not dealt with the report of the Lee Commission in our columns. The reason is that the *Indian Medical Gazette* has always been, and we trust will always continue to be, absolutely non-political and non-partisan, confining its attention entirely to matters of professional interest. In our opinion medicine and politics form a very bad, if not an incompatible, prescription; and the less that the young medical man has to do with politics, the better for his professional abilities. Independence and clarity of thought, judgment, sympathy, kindliness,—all these are qualities which the practice of medicine should inculcate in the medical man as his experience widens and as his years mature; but it is impossible to cultivate them amid the welter of party politics. With the retired medical practitioner, the case is different; the years have brought him a wide knowledge of mankind, experience, a power of calm and clear judgment. Such a man is eminently fitted to advise in the counsels of state, and the British House of Commons has frequently numbered and to-day numbers several such elderly and distinguished medical men amongst its members. The only question here is as to whether such a man's high ideals and character can tolerate the dust, the chicanery, the intrigue, and the acrimonies of political life.

Yet the future of medicine in India cannot be divorced from India's political future, and the present position is one of such difficulty that it demands the very clearest of thinking and prevision. Without some clear lead and in the absence of any well planned policy, matters may easily drift into such a position that the status of medicine in this vast subcontinent may substantially deteriorate, until nothing but a chaos of conflicting systems and vested interests results, to the infinite detriment of the people.

We may take it as axiomatic that the political future of India will be complete Home Rule, with or without Dominion status. The political parties are one and all agreed upon this point; they differ only as to the rate of realisation of this objective, and the road to be travelled towards it. In the future we visualise, then, a series of independent provincial governments, each having almost complete control of all the functions of government and of the purse, but linked together by some form of central government which will control such matters as foreign relations and the defence of the country, together—probably—with an advisory relationship to the provincial governments. Under such a system of devolution, what is likely to be the future of medicine in this country?

Of the many systems of medicine to-day practised in India, it is probably true that some nine-tenths of the masses of the Indian population depend on Ayurvedic medicine in some form or another, and that Western medicine to-day only reaches about one-tenth of the population, despite the network of hospitals and dispensaries with which the land is covered. And of recent years the claims of the Ayurvedic system, which had for so long slumbered, have been brought forward. At least three provincial governments have appointed and received reports from specially appointed Ayurvedic committees, reports on which we hope to comment as soon as they come to hand. The practitioner of Western medicine is wont to hold the Ayurvedic system in contempt, but that is simply on account of his ignorance of it. It admittedly has tremendous defects; its anatomy and physiology are crude; its practice of midwifery and surgery it has long ago forgotten; it has no pharmacology, as was the case with Western medicine until a few decades ago. Yet its merits are greater than its demerits; *it*, and not Western medicine is the medicine of the people; it has age-long traditions; it is deep rooted in the customs and habits of the people; its dietetics especially are based upon Indian dietaries and

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meet Indian requirements as to caste, creed, and constitution; whilst many of its leading practitioners are men of great clinical acumen and skill. As yet text-books of Ayurvedic medicine are few and scanty, and the practitioner of the Western system, ignorantly believing that there is no body of truth with which that system does not deal, ignores it. He would do better to study it and take from it what is good.

The Western system in India is a painstaking copy of the system of medicine prevalent in Great Britain about twenty years ago. One has only to look through the examination syllabus for any Indian university M.B. examination to realise the truth of this statement. Thus in pathology great attention is paid to the histology of tumours, very little to the laboratory diagnosis of malaria, and none at all to a knowledge of what anopheline species of mosquitoes transmit malaria; in "pharmacology," the student is expected to be able to identify the leaves of *Digitalis purpurea*—a piece of information which could be of no possible use to anyone except a botanist or a pharmacist—but he is not shewn in an experimental pharmacological laboratory how digitalis acts on the heart, an experiment which would once and for all teach him the uses, value and limitations of the drug. Under such a syllabus, pharmacology, which should be a rational science, becomes pharmacy, a science which is largely empirical. The result of such a syllabus is to turn out qualified medical men who are usually fairly good on the clinical side, just as were the British physicians of twenty years ago, but strangely ignorant concerning the commonest of the many tropical diseases which they will encounter when they enter upon practice. The system is good; in origin it is the product of the work of the Indian Medical Service in India, and that Service has no reason to be ashamed of it, but it has its defects. The average practitioner of the Western system is as a rule a far better man than is his Ayurvedic brother of average merit; but each has something to learn that the other can teach.

Further, the professors of this system are too often men who are so much absorbed in private practice that they scarcely have the necessary time to devote to improving their teaching, or the necessary leisure for reading to bring them up to date. It is proverbially easy to be wise in retrospect, but it is now becoming apparent that, in the big fight which the British Medical Association put up some years ago on behalf of the Indian Medical Service, it was a mistake in policy to insist upon the "right" to private practice. It might have been wiser policy to have waived that right in exchange for a non-practising allowance, leaving the officers concerned a sufficiently comfortable income to live upon, freed from the dire necessity for incessant private practice, and with more time to devote to their official duties. In the case of the organisation of any new provincial or imperial medical service in India, this question should be most seriously considered. The Indian Medical Service can well afford to ignore the volume of abuse with which it is nowadays so constantly assailed in this country. Whether we are to see its abolition, or its transformation, its record in peace and war, in public health and medical relief, in medical education and medical research work is too splendid for mere abuse to dim its lustre. Together with its hard-working assistant cadres of assistant and sub-assistant surgeons, it has effected a revolution in matters medical in India during the past half century. If it is now to be abolished, we trust that its members will not desert the sinking ship, but will take their share in the moulding of the medicine of the future in India.

Yet, if such agitation has any real foundation and justification, it may be found in two principal grievances; the competition of the salaried medical official against the private practitioner, both Indian and European, for private practice; and the imposition on this country of a system of medical education which is not really suited to its needs. In reply to the first, it may be pointed out that the salary has hardly ever been sufficient for the officer to live upon; and in reply to the second, that the Indian universities have chiefly themselves to blame.

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We have dealt so far with the two chief systems of medicine in this country. There are several others, but the conditions prevalent are similar, and they need not be discussed independently. As a last factor in the present-day situation we may note the existence of a strong separatist movement, aiming at freeing Indian medicine from any control by the General Medical Council of Great Britain. Thus we understand that at the recent M.B. examination held by the Calcutta University the delegate appointed by the General Medical Council to inspect the conduct of the examination was refused admission to the examination, and reported this fact accordingly to that Council; with the result that the M.B. degree of this university will not be recognised by the Council with effect from December, 1924*. We may—in fact, we do—deplore this feeling, but it is idle to ignore the fact that it is prevalent.

Under present-day conditions, when the newly qualified English medical man comes to this country, whether as an officer of the I.M.S. or of the R.A.M.C., as a doctor to a group of tea gardens, or as a medical missionary, he soon discovers that he is up against facts and conditions of which he has had no previous experience. To a lesser degree, the newly qualified medical graduate of an Indian university finds the same thing. What the newcomer finds he has to deal with, for instance, are not cases of benign papilloma or of carcinoma of the colon, of scarlet fever or of acute rheumatism; but of plague, of malaria in all its protean manifestations, cataract, vesical calculus, the leishmania infections, kala-azar or oriental sore—neither of which diseases he may ever have seen—leprosy, tropical diseases of the skin, filariasis, guinea-worm infection—to name but a few. Some of the ground is familiar; much of it is entirely new. Thus he has soon to learn that cataract is usually treated, not by needling, but by either the capsulotomy or expression operation; that litholapaxy and not supra-pubic cystotomy is the favourite operation for vesical calculus; that the microscope is not an unfamiliar object, but a veritable necessity in the daily practice of medicine in the tropics, and a knowledge of certain essentials of methods of microscopical examination of stools and of blood films is absolutely necessary. In other words, he is up against the fact that, however, brilliant a medical student he may have been at his medical school, he is in a world of diseases of which he has but a scanty knowledge.

With regard to the I.M.S. and the R.A.M.C., the "Millbank" course is supposed to remedy this defect. But, in the experience of many such officers, it does not do so. It is unreal and divorced from the actual facts of the situation,—except in its pathology.

And so we come to our first proposition with regard to the future of medicine in India. Medicine is not national, but international; it has no room for narrow sectarian, systemic or national jealousies. And here we would appeal most earnestly to the medical profession in India to form the nucleus of a brotherhood independent of party and sectarian politics. There is ample room in this country for everyone; for the British and Indian service officer, for the private practitioner, for the Ayurvedic, Unani or Tibbi doctor. Both the European and the Indian medical graduate should get to know each other better than they do; medical clubs and societies should be encouraged, and each large teaching hospital should be a meeting ground for East and West, socially as well as professionally.

Secondly, the value of the indigenous Indian systems of medicine should be carefully studied and investigated. Some Ayurvedic physicians demand the immediate subsidising by the State of Ayurvedic hospitals and dispensaries; they will have nothing to do with Western medicine; in their hands rests all truth; and it is the pure and undefiled gospel of Ayurveda that they demand should be subsidised. Such a mental attitude is as illogical as that of the practitioner of the Western system who can see no good in any other. What is desirable is that what is good in both systems should be combined, that the Ayurved shall learn the anatomy, the physiology, the modern midwifery and the present-day

* Vide *Brit. Med. Jl.*, 16th Aug. 1924, supplement, p. 102, end of the first column.

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experimental pharmacology of the Western system; that the practitioner of the Western system should study the dietaries, the methods of health cultivation, the better known drugs, and the special methods of treatment of the Ayurvedic system. For the hundred-and-one every-day ills of life the Ayurved can prescribe just as successfully as his confrère of the Western system; it is only in the presence of serious illness that the latter excels.

Thirdly, the conditions of medical education in India call for drastic reform. Beginning at the top, it is necessary to gather together the ablest available men in the country for post-graduate teaching; men who will teach from their own knowledge and experience, and not what they themselves learnt out of a text-book twenty years ago. To some extent we have already the beginnings of such a system in the Calcutta School of Tropical Medicine, with its ambitious programme of post-graduate teaching and research, with an examination for the Bengal Diploma in Tropical Medicine which is conducted with searching severity, and the standard for which is so high that its possession by a medical man is at least a guarantee of a certain degree of efficiency in tropical medical practice. Also the post-graduate teaching movement is extending in other centres in India.

From amongst such trained post-graduates must ultimately come the teaching staffs of the medical schools and colleges scattered throughout India. If the standard at the top is but set high enough, the standard of the lower pass examinations is bound to become raised. At present it is very low. The introduction into India of a system of elementary education founded upon the three R's and copied from the English system, without any consideration of the real needs of this country, has led to the creation of an enormous army of the literate unemployed. Similarly the imposition of the Western system of medical education, unmodified to suit the real requirements of India, has led to the creation of an army of doctors who will not go into the mofussil—where their knowledge is badly needed—because they think that they cannot earn a livelihood there, but who congregate in the larger cities, and spend lives of cut-throat competition. Thus it is probably not untrue to say that Calcutta is about the most highly medicated city in the world, and that most of its shops appear to be divided between motor car repair workshops and doctors' pharmacies, of varying grades of unsuccessfulness.

In brief medical education in India should be thoroughly overhauled and re-organised. There is nothing wrong with "Western" medicine; it is becoming every year more and more rational and less and less empirical, it is always willing to learn; it is both flexible and adaptable to differing countries, climates and problems. The new Union Medical College at Peking, for instance, recently created by the Rockefeller Foundation, illustrates how adaptable it is to Eastern needs. And a minor but very important point is the want of good, reliable but *cheap* text-books. The Indian medical student is poor; the large English and American text-books are beyond his purse. Not only so, but they are often quite unsuited to the practice of medicine in the tropics. To give but two examples, the 1923 edition of a well-known English text-book of medicine refers kala-azar to the piroplasmoses, whilst the 1923 edition of a well-known English text-book of public health teaches that malarial oöcysts rupture into the mosquito's mid-gut. The Indian medical student asks for something cheap and reliable, written by men with many years' experience of medical practice in the tropics. What is supplied to him is some enormous English or American tome, written by men utterly unfamiliar with the tropics. Even so valuable a book as the 7th, 1921 edition of Manson's "Tropical Diseases" is often beyond his purse. A few publishers in India have done something towards meeting this demand, and in this connection both Messrs. Butterworth and Messrs. Thacker, Spink deserve honourable mention, but only the fringe of the subject has as yet been touched.

To the demand for a real reform of medical education in this country, the politician's reply will be, of course, that there is no money for anything of the sort. He wants cheap doctors and mass production. But one good doctor is worth a dozen quacks, and money

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spent upon raising the standard of medical education in India would be money wisely and beneficially expended. Even under the present adverse conditions the number of really able Indian doctors is very considerable; many of them indeed possess the highest British qualifications; raise the standard—especially in the practical tests—reform the syllabus; insist upon whole-time teachers and upon only selected men at that; make post-graduate teaching in this country more of a reality and less of a pious hope; and within a decade the status of medicine in India will be as high as in any other civilised country.

* * * * * * * *

To summarise, in what direction are we going to advance? A policy of drift—the favourite policy with every politician in a difficulty—is going to lead us nowhere. It will end in the country being given over to the professors of a dozen different systems, warring with one another, until medicine in India finally reverts to domestic "medication," with disastrous results.

The alternative is to study the conditions present and the systems in vogue; to take from each what is best in it; to build up, gradually, little by little and line upon line, a true universal Indian system of medicine, with its own medical literature, its own indigenous pharmacopœia, its own teachers, moulded and adapted to the real needs of the country and its peoples. It must be based, of course, upon present-day "Western"—but really international—scientific medicine; no other alternative is possible; but it should incorporate all that is valuable in the indigenous systems. And, in the long run, such a policy would pay in cash, in improved public health and in the control of the vast epidemics which sweep this country, in a happier relationship of its peoples,—in a word, in progress. Also it will be no isolated and segregated "system" of its own, but part of the international body of medicine of the future, adapted however to the local requirements.

R. K.

A Mirror of Hospital Practice.

ANTIGALACTISM.

By SHEAM MANOHER LAL,
Civil Surgeon, Sultanpur.

My baby aged six months was not able to retain and digest cow's milk in any form. Milk was predigested, pasteurised, citrated, diluted, mixed with lime water and the feeding of the cow was supervised in turn. But whatever was done the milk was rejected soon after feeding, and the child became distinctly ill. The stools were also examined and though no amœbæ were found, emetine was also given. But the milk could not be taken. Several different cows were tried in turn without any benefit. I then thought of immunising the baby against cow's milk, which I injected hypodermically and unboiled, diluted with normal saline solution, under full aseptic precautions. The doses given were as follows:—

25-2-'24. 0.01 c.c., no reaction.

28-2-'24. 0.02 c.c., no reaction.

2-3-'24. 0.05 c.c., no reaction. Milk ¼ oz. retained t.d.s.

5-3-'24. 0.075 c.c., no reaction. Milk increased to ½ oz. t.d.s.

8-3-'24. 0.1 c.c., no reaction.

11-3-'24. 0.2 c.c., slight diarrhœa. Milk increased to 1 oz. t.d.s. from the next day. Digested well.

15-3-'24. 0.3 c.c., no reaction. Milk increased to 1 oz. t.d.s. Digested well.

17-3-'24. 0.4 c.c., no reaction. Milk 1 oz. t.d.s. Digested well.

19-3-'24. 0.5 c.c., no reaction. Milk increased to 6 ozs. in 24 hours.

22-3-'24. 0.75 c.c., slight vomiting and diarrhœa: no milk given. Milk increased to 8, 9, 10 and 12 ounces in 24 hours and digested well on subsequent days.

25-3-'24. The child has increased in weight and has a healthy appearance.

31-3-'24. 1 c.c. of milk injected, no reaction. The child now takes cow's milk with impunity.

Comment is unnecessary. I have called this condition of milk intolerance, antigalactism. I hope others will be able to try the treatment in suitable cases of children who cannot take milk.

SULFARSENOL IN RAT-BITE FEVER.

By BALKRISHNA N. MEHTA, M.B., B.S.,
Juvasingji Dispensary, Bhavnagar.

A Hindu male, aged 40 years, with a history of fever off and on of two months' duration

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was seen on the 25th July. He contracted this fever in Bombay.

On examination the patient looked very emaciated and complained of extreme weakness. The temperature was 96.4°F. The pulse was 120, and was soft and feeble but regular. The colour of the skin was earthy and pale. The conjunctivæ were pale yellow. The pupils were normal. The pharynx was slightly congested and there was a slight dry cough. The breath sounds were deficient at the right apex, but there was no dullness. The heart beat was feeble.

The liver and spleen were not enlarged. The bowels moved once daily but with a tendency to constipation.

The appetite was impaired only during pyrexial periods. There was slight œdema on the dorsum of the feet.

The patient complained of deep and dull aching pain in the thighs. A little headache was felt during the pyrexial periods. His temperament had become irritable and he did not like to be disturbed by his relatives. He had had no good sleep for the last month. The sputum was negative for tubercle bacilli and blood examination showed no parasites.

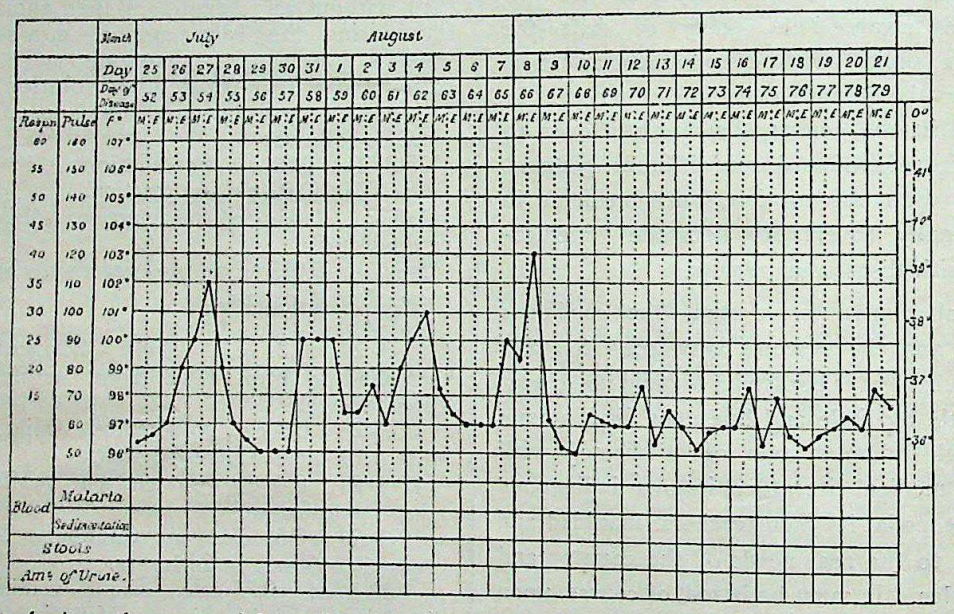
The temperature chart showed successive paroxysms of pyrexia of from 24 to 36 hours' duration, followed by apyrexial periods of from 40 to 60 hours' duration. The temperature remained sub-normal during apyrexial periods.

No glandular enlargements or eruption were noticed and there was no bleeding from anywhere.

The urine contained no sugar, albumen or indican.

The diagnosis remained unsettled and so the patient was seen again in consultation with Dr. Phyrozshan, when attention was drawn to a small superficial scar surrounded by a black pigmented area one inch wide on the posterior aspect of the left arm. When questioned about it, the patient said that he had been bitten by a rat in Bombay a few days previous to the first attack of fever. The wound had taken a month to heal. It may be mentioned that the patient had not given any history of a rat bite at the first examination.

This history almost settled the diagnosis, and accordingly it was agreed to give an injection of some preparation of arsenic. Sulfarsenol was selected because of its low toxicity and an intramuscular injection of 18 cgm. was given on the 10th of August at 6 p.m., i.e., twenty-four hours previous to an expected attack of pyrexia. The temperature remained sub-normal. Another injection of 18 cgm. was given on the 16th, because the patient still complained of pain in the thighs. At the moment of writing the patient is free from all symptoms except weakness.



It may be argued that in the absence of any definite history of a bite it is difficult to diagnose a case of rat-bite fever, but the often repeated paroxysms of fever in definite cycles with great debility and the absence of malarial and relapsing fever parasites in the blood may give a hint as to the diagnosis. My thanks are due to the chief medical officer, Dr. Phyrozshan, for his kind help.

THE THERAPEUTIC VALUE OF INTRAVENOUS IODINE.

By J. C. CHAUDHURI, L.M.S., Bogra.

An article on the above subject by Lieut.-Colonel Jeudwine appeared in the *Indian*

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Medical Gazette for December 1923. I have been using iodine intravenously for the last 6 or 7 years, and I think I have gathered some experience about its therapeutic value. I have used it in numerous diseases, with more or less success, the following being some of them:—typhoid, influenza, lobar pneumonia, broncho-pneumonia; fevers of unknown origin running a remittent course; cancrum oris, erysipelas, septicæmia, sepsis, local or generalised; tertiary syphilis; malaria and kala-azar.

As to the rationale of treatment, I have not much to add to what has already been said by Colonel Jeudwine, except that I believe that at least in some diseases iodine has a specific action upon the micro-organisms concerned and mere leucocytosis cannot explain the results; e.g., in kala-azar iodine increases the leucocytes, but it has apparently no action upon the spleen or duration of the fever.

Preparation of Iodine and Dosage.—The difficulties of Lieut.-Colonel Jeudwine appear to be due to his using ordinary tincture of iodine,—a spirituous solution. In my earlier years, I also used to get some of his troubles—except thrombosis; this was perhaps due to my using a very small dose of the tincture, 3 to 5 minims in 3 to 5 c.c. of water. But even this small dose usually used to bring on a severe reaction, and so I substituted distilled water for the spirit, and this aqueous solution gave me no trouble whatever, except mild reaction in some cases. I use as a rule 5 to 10 minims of this solution and repeat it once daily or on alternate days, as the necessity of the case demands and give the injection usually into the same vein without any local irritation or pain or risk. In fact, in my numerous cases, I have not noticed a single case of thrombosis. The dose was usually diluted with 3 to 5 c.c. of sterilised distilled water.

After-Effects.—Within an hour of the injection there is usually a rise of temperature of from one to several degrees—preceded by rigor. The rigor is sometimes very prolonged and severe. In the next hour (or sometimes a little later) the temperature begins to fall, with profuse perspiration, the patient generally feeling very comfortable with a lessened pulse and respiration rate. Sometimes a quick pulse becomes very slow, with low tension but without affecting the volume.

Technique.—Any ordinary syringe for intravenous injection may be used. An experienced hand easily ascertains that the needle is right up into the lumen of the vein, and also from the continuous flowing in of blood into the syringe by its darker colour, a good light being essential. With this aqueous solution diluted in the manner I have said, I never got the lumen of my needle blocked. For bandaging the arm I always use a small piece of soft rubber tubing, loosely tying it around the arm and thrust in the needle into the vein with the right hand and then with my left hand I untie the loose knot, the right hand holding the syringe steady with the needle in the vein and then with the left hand push the piston home, thus requiring no assistant at all.

The usual aseptic precautions are of course taken. Before giving a brief note of some of my recorded cases, I may note here my impressions about the benefit of intravenous iodine in the diseases in which it appears to be most effective in the order given below.

Cancrum Oris.—In this almost hopeless condition iodine acts as a specific. I have treated more than 50 cases in various stages of development, in age varying from 2 years to old age, and I never met with any disappointment, provided it was not too late. Usually 3 to 5 injections were found necessary.

Erysipelas—Septicæmia.—Generally very effective; it reduces fever wonderfully, lessens toxæmia in a markedly short time (probably due to elimination through profuse perspiration and phagocytosis).

Lobar Pneumonia.—Usually very effective. Three injections or less bring down the temperature to normal and convalescence is rapidly established in uncomplicated cases.

Typhoid.—Fever greatly reduced; toxæmia lessened; risks of complications minimised; sometimes runs a very mild course with the usual duration;—occasionally the duration is shortened; meningitis and other brain symptoms, if the injections are given early, are checked or lessened. There is no apparent benefit when complicated with *B. coli* infection.

Influenza.—Uncertain; some cases greatly benefited—others not so.

Local Sepsis.—Boils, carbuncles and septic wounds are greatly benefited.

Malaria.—Does not altogether stop the paroxysm, though it breaks its remittent course.

Kala-azar.—Of doubtful utility in the initial stage, but if given occasionally together with the usual antimony treatment it seems to increase the leucocytes more rapidly.

Tertiary Syphilis.—Given with potassium iodide, it seems to be very effective.

Fevers of unknown origin with no malaria parasites found and the Widal reaction negative. Usually 3 to 4 injections cure the patient.

I may mention here that I tried it in some cases of cholera also. Some early cases did well, but I am waiting for further experience on the subject.

With these impressions, I may safely predict that intravenous iodine has a great future before it, and is destined to occupy a place second to none in the armoury of the physician, especially when he is called upon to treat a case of

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infectious fever, or sepsis, local or constitutional.

I here append brief notes of some of my cases:—

ILLUSTRATIVE CASES.

Cancrum Oris.

(1). Hindu male child, aged 10, suffering from kala-azar. Cancrum oris developed, affecting both upper and lower jaws, with the whole of the left side of the face swollen and the left eye closed. A portion of the lower jaw necrosed and sloughed. The pulse was very rapid. Tincture of iodine was now given in 2 m. doses daily. After the 2nd injection the disease was arrested, after the 3rd the swelling commenced to disappear, and after the 6th injection the iodine was discontinued. The patient made an uneventful recovery.

(2). Hindu male child, aged 7, suffering from kala-azar. Cancrum oris developed in five different foci in the mouth, both jaws, pharynx and soft palate. Several teeth came out and the mandible was affected. Two minim doses were given daily and all foci became healthy after the 4th injection. The patient recovered in a month and a half.

(3). Mahomedan male child, aged 3, with kala-azar. Cancrum oris set in in the upper jaw on the left side with swelling of the face. This case was seen early and two injections, of 1 m. and 2 m., proved sufficient for cure.

(4) Hindu female child, aged 3, suffering from kala-azar. Cancrum oris set in in the lower jaw and several teeth came out. Three injections of iodine cleared up the condition.

The antimony injections in these cases were stopped during the iodine injections, and were resumed only when the wounds were nearly healed, as it was found that the antimony hindered satisfactory progress.

Erysipelas.

(1). Adult Hindu male, the condition starting from a carbuncle on the back, and affecting the whole of the back down to the iliac crests, and the arms down to the elbows. Temperature 105°F., pulse 130, symptoms of toxæmia present. Serum and vaccine treatment were tried without improvement. Tincture of iodine in 5 m. doses was next given. The temperature came down to 100° with profuse sweating immediately after the first injection. Three further daily injections completely cured the condition.

(2). Adult Hindu female, with erysipelas following on operation for mammary abscess. Blebs encircling the chest with high fever and profound toxæmia. This case was seen early, and three injections brought about cure.

Typhoid Fever.

(1). R. K. C., pleader, aged 28. Fever of 16 days' duration, and continuous, ranging between 104 and 105°F., with cerebral symptoms, bronchitis and a slow pulse. The Widal reaction was positive at 1 in 100 dilution. Iodine was given on the 16th day when the temperature was 104°F. Reaction occurred and it rose to 106°F., but within the next hour came down to 102° and in the evening to 99°F. Next morning it rose to 102°F., when a second injection was given. The temperature dropped to 99° and the next morning a third injection brought it down to normal and convalescence was established.

(2). Hindu male, aged 25. A very badly managed case of typhoid, when first seen in a most serious state, comatose, with fibrillary tremors, abdominal distension, broncho-pneumonia and persistent hiccough for the previous 4 days and nights. Pulse 120, respiration 50. After the first iodine injection, the temperature dropped from 103° to 101° with profuse sweating, but there was no improvement in the symptoms.

Second day. Iodine repeated, consciousness partly returned; temperature 99.5; pulse 100; respiration 30.

Third day. Iodine repeated. The temperature did not rise above 99°. Patient almost conscious, lungs clearer, hiccough however continued at intervals during the day.

At this stage I had to leave the case to see an even more serious one, and left the patient to an assistant who tried to cure the hiccough by chloroform inhalation and hypodermic injections of morphia. The patient's condition became worse with suppression of urine, severe bronchitis, high fever and abdominal distension. On my return the iodine injections were repeated with other measures, and convalescence was established a week later.

Pneumonia.

(1). Mahomedan male, aged 36. Left lower lobe affected; temperature 103°; respiration rate 60, pulse 140, condition very grave. First seen in consultation on the 4th day of disease. Iodine was given in the early morning; by evening the temperature was normal and the symptoms much relieved, but consolidation remained. For two days the condition was satisfactory, but the temperature then recurred and the entire left lung was found to be affected. Three further iodine injections brought about complete recovery.

The above cases have been selected as being those where the condition of the patients was very serious. In many of my cases the blood was examined for me by the Clinical Research Laboratory, Calcutta, and I take this opportunity of thanking the public-spirited doctors who conduct it.

A CASE OF ACQUIRED VENTRAL HERNIA.

By DHINA NATH KHOLI, M.B., B.S.,

Chief Medical Officer, Mandi State, Punjab.

THE patient, named Phinu, aged 10 years, Mahomedan, the son of agriculturists by profession and a resident of Hatgarh Tehsil, Sadar Mand, was admitted to the King Edward VII Hospital on 5th January, 1924, with the following history and conditions:—

History.—Three years ago the patient got a small soft swelling over the lower part of the middle line of the abdomen near the umbilicus. The swelling gradually grew bigger and bigger, but could be reduced into the abdomen. One year ago the swelling ulcerated at one spot and discharged thin pus. The ulcerated portion then healed up and about a month later another portion ulcerated similarly. This process was repeated three or four times. At present the swelling persists and is ulcerated in its middle.

Local condition.—The swelling is reducible, dull on percussion and reddened on the surface. The margins of the hernial opening are defined. A small ulcer is present in the middle of the swelling; this leads to a sinus about ¾ in. long.

Treatment.—The patient was treated on general lines for some time. On 9th January, 1924, the sinus was opened for about an inch and well scraped. It was found to be about 2 in. long. As the sinus showed no signs of healing, the patient was prepared for operation, and operation was performed on

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15th January, 1924, under chloroform. A curved incision 3 in. long running from above, downwards was made, ½ in. to the left of the middle line, to be as far off the sinus as possible to avoid introducing infection into the abdomen. The sac was reached. The opening in the abdominal wall was defined on the side away from the sinus. The sac was adherent, its neck could not be defined. It was soon found that the sinus was about 4 in. long and led right into the abdomen. A second skin incision (similar to No. 1) curved to the right of the middle line was made, this included the opening of the sinus. The sac was separated and the piece of skin thus marked out was raised.

The sinus was laid open for about 3 in. and the cicatricial tissue thoroughly removed. The sac was accidently opened while it was being separated from the overlying skin and the gut came out; it was pushed back into the abdomen. *The sac was not removed and the edges of the opening were not freshened.* The hernial sac was pushed into the abdomen and the long edges of the hernial opening brought together by continuous catgut sutures. The two ends of the suture were tied together. The skin wound was closed with silkworm-gut (interrupted sutures), a pressure pad applied, and the part bandaged. The bowels did not move the following day and the patient had a rise of temperature to 100°F. The bowels moved well on 17th January, 1924. The patient had an uneventful recovery and the wound was quite healed on 26th February, 1924. He was discharged on 3rd March, 1924, completely cured with no hernia and no sinus. The patient could move and run about. He was again seen on 7th April, 1924 and was well, with no sign of recurrence.

The special features of the case were:—

1. The hernia appeared 7 years after birth and was not congenital.
2. The cause could not be traced.
3. The area repeatedly ulcerated and left a sinus, all this without infecting the abdominal cavity.

Special features of the operation were:—

1. The hernia and the sinus were dealt with at the same time.
2. The hernial sac was not removed and the edges of the wound were not freshened.
3. Notwithstanding this, recovery was complete.

A CASE OF IMPERFORATE ANUS.

By K. M. HULI RAO, L.M.S.,

Assistant Surgeon, Local Fund Dispensary, Thirtahaki Shimoga District, Mysore State.

On the 23rd January, 1923, while I was in charge of the Local Fund Dispensary at Sorab, a female child aged 6 months, was brought to me with a history that the child had no anus at all from birth and that small quantities of liquid fæcal matter occasionally escaped from the vagina. Since the child was not in any way inconvenienced, the parents did not mind this abnormality.

During the last fortnight or more the child had been fed on solid diet and consequently the child was found to be in great distress occasionally and a bulging was noticed on those occasions in the region of the anal opening. The child used to have temporary relief when a small quantity of the liquid fæcal matter escaped from the vagina.

The baby was quite healthy and well built and did not seem to be in the least affected by this abnormality. The abdomen was distended and hard. Local examination revealed the total absence of any anal opening and the escape of small quantity of liquid matter from the vagina shewed the presence of recto-vaginal fistula.

A bulging was also noticed in the anal region when the child cried.

Treatment.—A vertical incision one inch and a half long was made in the middle line in the region of the anus. When the fascia was separated the rectum was found bulging. A similar incision was made and the mucous membrane of the rectum was stitched to the skin flaps all round. When the rectal incision was made a large quantity of foul smelling solid fæcal matter escaped. Next day a dose of castor oil was given. The wound was dressed daily and it healed by first intention in a week. Subsequent to the operation the escape of fæcal matter from the vagina stopped altogether.

About three months later the child was seen by me and the anal opening was quite patent and I was told that there was escape of fæcal matter from the vagina.

A CASE OF RUPTURE OF THE RETINA.

By K. N. PRADHAN, *Eye, Ear, Nose and Throat Hospital, Nagpur.*

On the 5th of April, Mr. J. came to me with a history of having been struck on the left eye at 2 o'clock three days previously by a tennis ball. He had felt but little pain, but was suffering from flashes of light from the left side. He gave a history of swelling at the spot on the limbus where he had been struck, but I could find no local residual inflammation. The pupil was active, and under homatropine all the surfaces and media were quite clear; but at about 2 disc distance intervals there was a horizontal streak where the normal red retinal reflex was absent and pigment could be seen. The length of the

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streak was about 5 mm. It is rare to see such fine rupture of the retina without involvement of the pigment layer of the choroid.

Coloured glasses were advised for the patient, but they did not relieve him. On the 6th day 1 per cent. eserine, one drop, was instilled. Next day he came and informed me that the flashes of light had completely disappeared. He is now free from all symptoms. I examined for scotoma with a perimeter, but the result was inconclusive.

SPECIAL ARTICLES.

ON THE IMPORTANCE OF KEEPING COOL.

By J. W. D. MEGAW, M.B.,

LIEUT.-COLONEL, I.M.S.,

Director, School of Tropical Medicine, Calcutta.

THE fight against unfavourable environment in the tropics is reaching a fresh stage of development.

During the past half century, medical science has acquired knowledge which gives us the power to control the great fatal diseases of the tropics. This knowledge has not yet been made use of by the great mass of the people, but if we look at the steady decline in the death rate of the British and Indian troops in India during the past seventy years, we must realize that the mortality from infectious diseases in this country can easily be reduced to the level which prevails in colder countries. The insidious wastage of human life and effort which is caused by high air temperatures in the tropics has not yet been seriously studied.

It is strange that scientists in England and America should be so deeply interested in the effect of atmospheric conditions on health and efficiency, while we in the tropics, who are much more affected by climate, are quite indifferent. Our apathy towards a matter which is of first class importance to us suggests that one of the effects of prolonged exposure to heat is to beget a fatalistic attitude towards our health and comfort. Leonard Hill and other workers have found that there are certain conditions of air temperature, moisture and movement which make for industrial efficiency: it is well known that our bodily and mental vigour are much lessened when the air is hot, especially if it is also moist and stagnant. Short spells of exposure to unfavourable air conditions may do little harm, but long periods of trying heat cause a lowering of vitality or even a permanent physical and mental damage. The introduction of the electric fan has brought about a great improvement in the climatic conditions of the larger towns in the tropics, but apart from this there has been very little effort to counteract the effects of excessive heat. The modern house in India is by no means so cool and comfortable as the old fashioned bungalow, and the crowding of large piles of masonry on confined sites has raised the temperature of the air in the business quarters of Calcutta and Bombay. The thermantidote and the *khuskhus tattie* are less common than they used to be and there seems to be a general impression that the artificial cooling of the air of houses in the tropics is positively dangerous. It is hard to get satisfactory evidence for or against the belief that the *khuskhus tattie* is harmful: it is possible that a draught of cool air blowing on one part of the body while the rest of it is overheated may cause lowering of vitality of the part that is cooled and hence predispose to bacterial or other diseases of the organs concerned. It is hard to believe that a change from an overheated atmosphere to one which is moderately cool can possibly be harmful: people who live in Canada or Siberia frequently go from overheated rooms into the open air when the thermometer records many degrees of frost, so why should a sudden change from air at 110°F. to air at 80°F. or *vice versa* be considered dangerous? Granted that people who live in the tropics are exceptionally susceptible to "chills," the reason probably is that their vitality has been lowered by prolonged exposure to heat: if they had been accustomed to a cooler atmosphere they would not be liable to get rheumatism or pneumonia from a breath of cool air.

Some people argue that as we have to live in a hot country it is better to accustom ourselves to the heat as soon as possible: they forget that the power of the body to adapt itself to its environment is limited, that extreme heat is devitalizing and hence actually lowers the powers of resistance to heat. It is well known that new comers to the tropics seldom feel the first hot weather, so much as the following ones. The best way to resist the heat of the tropics is to maintain the vitality of the body by keeping as cool as possible as long as possible.

The problem of keeping the air of a house cool is not a simple one, the methods which are suitable in the dry heat of the Punjab would be useless in the moist heat of Calcutta or Bombay; methods which are available for the wealthy business man are impracticable for the poorly paid clerk or peasant. The subject of air cooling can only be dealt with in the most sketchy manner in this note, which is meant to suggest possibilities rather than to deal with established facts. In places like Calcutta or Bombay the nights are reasonably cool if electric fans are used and if the rooms are constructed so as to get the full benefit of the prevailing breeze. Far too little advantage is taken of the fact that the outside air in the evening and night is much cooler than the air inside the house, heated by the masonry which has been baking in the sun all day. In the hot weather the chief function of a house is to protect us against the extreme heat of the day time. By throwing every door and window wide open at night and closing them every morning the house can be kept reasonably cool, and as far as possible we should live in the open air for that part of the twenty-four hours in which the outside air is cooler than the inside. Some people object to sleeping in the open, for them the next best thing is to place their bed close to a door through which the prevailing breeze blows: to insure against the failure of the breeze a table fan can be placed in the doorway. A good table fan, if properly placed at the foot of one's bed, will give complete protection against mosquitoes; the only objection to its use is the noise, to which one soon becomes accustomed. During the daytime it is more difficult to keep cool, especially when one has to work in an office. To begin with, the office is usually kept closed up during the night, so that neither the walls nor the air have been allowed to cool down; consequently one begins the day in an overheated room. To keep reasonably cool by day it is necessary to close all the doors and windows, and thus to live in a dark ill-ventilated room: the alternative is to admit fresh air whose temperature is so high that energy and mental activity are seriously reduced. Under such conditions in places like Bombay and Calcutta where the air is damp, nothing short of positive artificial air cooling is really effective. An installation for this purpose has been in use at the Calcutta School of Tropical Medicine for the past three years with the most satisfactory results. This was designed and constructed twelve years ago by the late Mr. Wilcox of Calcutta on my suggestion. The room is insulated, and is supplied with air which is passed over the coils of an ammonia refrigerating plant. The same fan is used for forcing the cool air into the room and for extracting the air from the room. Extra fresh air can be introduced into the circuit in any desired

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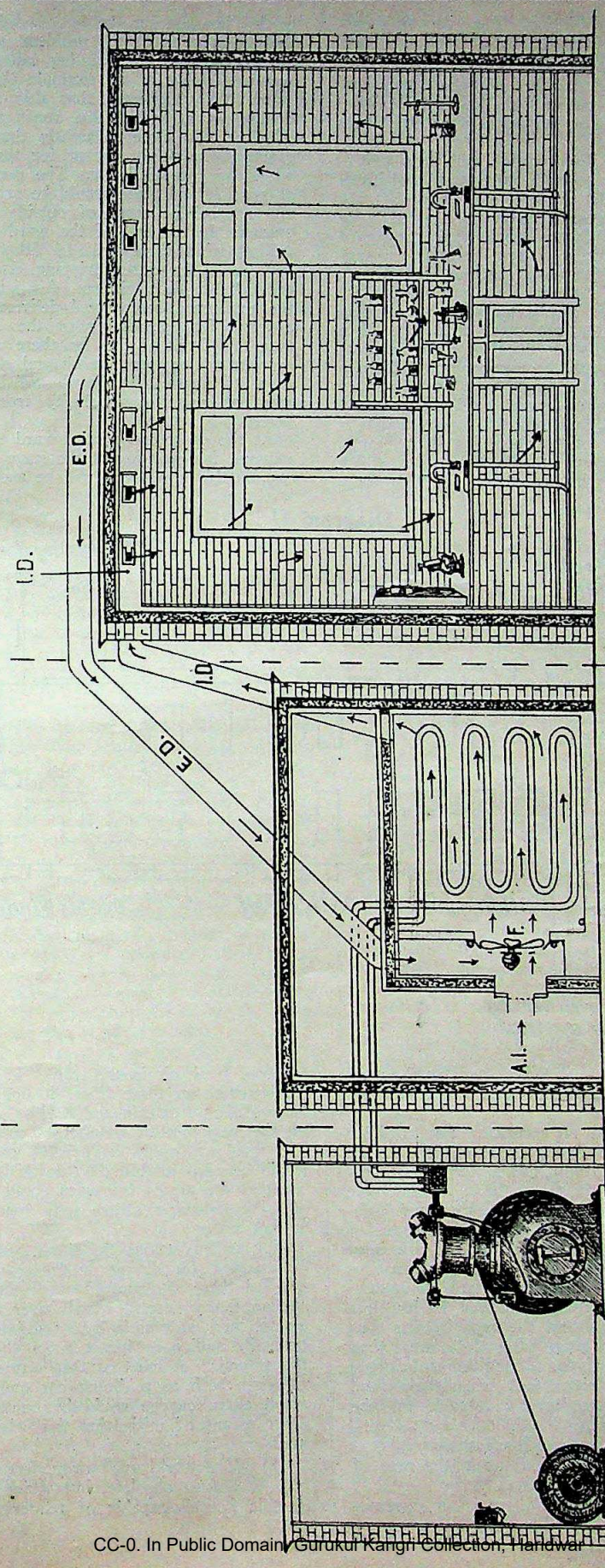
Diagram I.

DIAGRAM OF THE COOL ROOM.



COOL ROOM WITH INSULATED WALLS.

The arrows show the direction in which the air moves in the room.

The cool air enters by the openings in the Inlet duct (I.D.). The used air which is warmer is drawn out by the openings of the Exhaust duct (E.D.).

AIR COOLING CHAMBER.

The arrows show the direction in which the air travels.

A.I.—Air inlet for extra fresh air. This air as well as the rest of the air in the circuit is propelled by the fan (F.)

MOTOR AND AMMONIA COMPRESSOR.

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quantity to ensure good ventilation. The diagram shows the main features of the installation.

The advantages of this system are:—

(1) The air of the room can be maintained at a suitable temperature, irrespective of the climatic conditions.

(2) The air of the room can be kept as dry as is desired.

(3) The room is well lighted and well ventilated.

(4) The air can easily be made dust proof and insect proof by filtering the inlet air over cotton wool.

The only drawback connected with the system is its cost. The room in the Calcutta School is connected with the cold storage plant, so that it was not necessary to install a separate refrigerating machine, but merely to fit up a rather larger machine than would otherwise have been needed. Under such conditions the working costs are trifling, probably not more than Rs. 75 a month. If such a plant were installed as a separate unit the running costs would be much higher; perhaps Rs. 400 for a room of the same size. If suites of offices were constructed with central cooling it is likely that the cost of cooling each office to accommodate a single person would work out at about Rs. 100 a month. Cooled offices could be much smaller than those which are commonly found in hot countries, so that there would be considerable saving in space; and hence in the cost of building in places where space and labour are expensive.

It is not possible to make an accurate estimate of the increase in mental efficiency which would result from the use of such a room, but placing this at the lowest possible figure, there would certainly be a considerable economy in the case of the highly specialized and highly paid brain workers. It is just that extra degree of efficiency that makes the difference between the first class and the commonplace intellect. Apart from increased efficiency, there are other important advantages in living in a cool atmosphere, improved health, less need for expensive holidays and the capacity for continuing to work for several years after the normal time for retirement. Under existing conditions business men and officials have to retire just when their fund of experience makes them most valuable to the employers.

The value of the cooling system for hospitals, laboratories and libraries is just as obvious as in the case of private houses and offices.

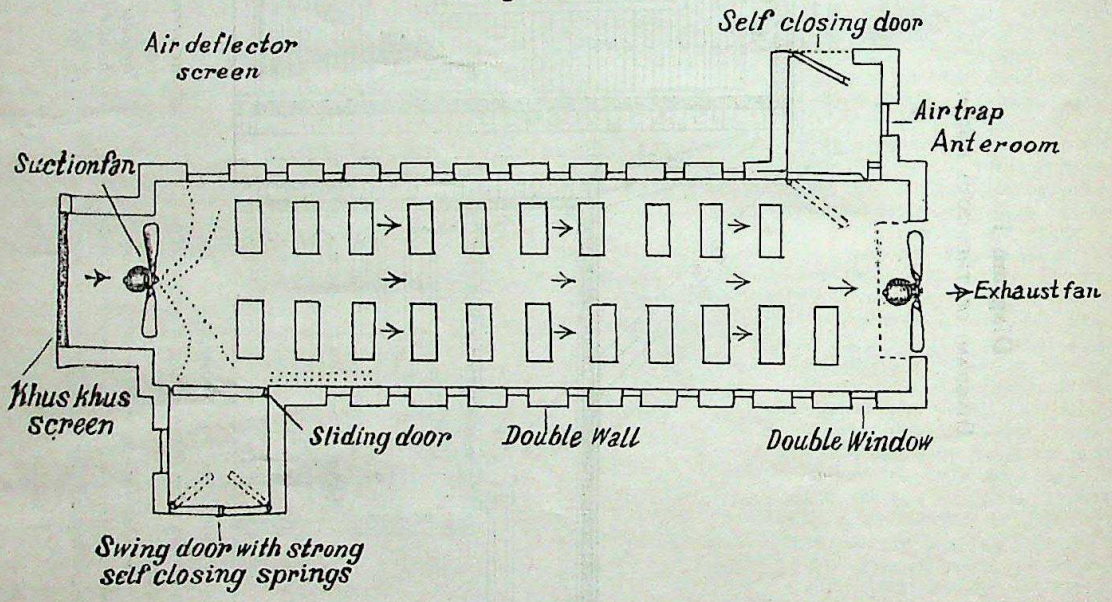
In places like the Punjab where there is an extremely dry heat during the hot weather months, a much cheaper solution of the problem is available: advantage can be taken of the cooling caused by evaporation of water. Taking as an example the case of a hospital ward, it is suggested that this should be built with double walls, and double roof and double windows which should close so tightly that the ward would be practically air-tight except for the air inlet and outlet which are provided for. The doors would be as few as possible and these would be arranged so as to avoid any appreciable entry of outside air when they are opened. In the end of the ward which faces the prevailing wind there will be fitted a *khuskhus* screen, kept moist by water dripping from a perforated pipe connected with a cistern. Air will be sucked through the moistened screen and delivered into the ward by a large fan, preferably of the "Sirocco" low speed type. In front of this fan there will be a screen made of wire gauze whose mesh and shape will be designed so as to ensure that the air will be discharged into the ward at a uniform velocity from every part of the screen.

At the other end of the ward there will be fitted an exhaust fan working at the same speed as the inlet air fan, in this way there will be a slowly moving column of cool fresh air in the ward. If the ward is properly constructed on these lines, it ought to be possible to secure a comfortable and healthy atmospheric condition in the very hottest weather. During the cold weather the windows would be opened wide or the verandahs could be used instead of the wards. In extremely cold weather the air of the ward could be heated by replacing the *khuskhus* screen with pipes containing hot air or hot water.

For railway trains the same system of cooling could be adopted for dining or drawing room cars. In the case of these, the movement of the train would supply the necessary current of air over the *khuskhus*. Wind shoots and automatically regulating shutters would probably suffice to direct a suitable stream of air on the screen. A car of this type might be arranged to serve both as a dining car and as a lounge car, a small extra charge could be made for its use. Some other means of mitigating the rigours of the tropics are:—

(1) The "tykhana" or underground room, which is now almost obsolete, but which in conjunction with electric fans is capable of rendering excellent service.

Diagram II.



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(2) The whitewashing of roofs and walls on the outside with a mixture of lime wash and size has been found to make a surprising difference in the air temperature inside houses.

(3) Double roofs with provision for air circulation between the two layers of the roof are also of great value, and if the roofs extend well beyond the walls of the house so as to prevent the sun from shining on these, the house will be kept remarkably cool. The walls should also if possible be made double, but care should be taken that the air space between the walls does not communicate with the inside of the house, otherwise a stream of heated air will be poured into the rooms.

(4) Improvements might be made in the disposition of electric fans. These are usually fixed so that they send down a current of hot air from the top of the room. If fans were constructed so as to be easily regulated in the matter of direction and position it would be possible to place the fan in the window or doorway in the evening and to fill the house with the fresh cool air. The existing table fans, if mounted on a portable stand, can be employed in a variety of positions, and but for the noise which most of them make, they are preferable to overhead fans in many respects.

(5) Places of amusement should if possible have removable roofs; failing these they should have large exhaust fans fitted in the ceilings to extract the heated air and suck in the cooled air through the doors and windows.

A Company called the Carrier Engineering Company of London and Bombay claims to supply factories and houses with air at any desired temperature and moisture. The air is passed over a fine spray of cold water in a room and in this way is washed and cooled; it is practically saturated with moisture at the temperature which is attained. When the temperature of the air is raised it is no longer saturated, though it still contains the same amount of water in each cubic foot. By an automatic regulating system it is possible to supply air to a room at a uniform temperature and containing a definite amount of moisture. The system is somewhat complicated and we have no information with regard to the initial cost or the working expenses. For factories in which absolutely uniform climatic conditions are essential, such a system must be installed; for hospital wards, laboratories and offices, a certain amount of variation of the air temperature and moisture is admissible and desirable.

The subject of air cooling in the tropics is one of great importance; it has been considered first of all from the point of view of highly paid brain workers, but in due course we may expect to find factories and mills supplied with air which is suitable for the maintenance of the highest degree of efficiency.

We may even look forward to the time when the pitiless rays of the sun will be harnessed and compelled to provide energy for working a refrigerating system by which both plants and animals will be supplied with favourable conditions for their existence. The future of mankind in the tropics depends on our power to modify an environment which at present is decidedly unfavourable.

PNEUMONIA, ITS COMPLICATIONS AND TREATMENT.

By C. F. CHENOY, M.B., B.S., D.P.H. (London),

Civil Surgeon, Raichur,

H. E. H. The Nizam's Medical Service.

THE importance of early recognition of pneumonia is fully appreciated by the medical profession, as the possibility of successful treatment depends largely on the case being diagnosed before it develops complications. In speaking of pneumonia I mean acute lobar pneumonia, a disease whose causal agent in my experience has invariably been the *pneumococcus*.

It is well known that a typical lobar pneumonia begins suddenly, especially in children, with a rigor, sometimes with convulsions. The temperature shoots up at once to 103 or 104°F. within a short period. I had a case of a seven year old child whom I had seen playing about in my friend's house at 1 p.m., with a slight cold in the head, as the parents put it. At 3 p.m. I was called for urgently. I found this child had acute pain in the right side of the chest, shooting downwards, with fever, 103.8°F. The face was flushed, the respirations hurried, and the pulse quickened but not quite in proportion to the rise of temperature. Luckily with regard to diagnosis in this case the right side of the chest showed signs of consolidation. The breath sounds were weak, but the tubular breathing and vocal resonance were greatly increased. This case illustrates beautifully the suddenness with which pneumonia may attack the patient.

The temperature, which shoots up to 104 or 105°F. in cases of pneumonia, may last for five or eight days and ends usually by crisis, falling below normal within a day. Often for a day or two there may be no physical signs and it is here that the medical man is at a loss, but if well observed the affected side of the chest will be seen to move more slowly than the other, and on percussion it will be found less resonant. In cases of hyperpyrexia it will be marked that there is a rapid diminution of liquid crepitations occurring. The theory set forth is that in these cases there is unusual absorption of toxic products from the alveoli into the blood stream, leading to hyperpyrexia.

The fall of temperature suggesting a crisis, is due to breakdown of the body's reaction to the bacterial toxins. In other words to a sudden development of antibodies, to the change of hydrogen-ion concentration in the affected part, or—according to McLeod—to the production by the germs of hydrogen peroxide, which finally destroys the organisms with their own products. There is no reason to believe that the mechanism of production of antibody against the pneumococcus and its toxins should be a different one, and therefore it seems likely that the steady intoxication of a pneumonia is abruptly terminated by the development of antibodies. Thus crisis occurs in the vicinity of the seventh—usually at the fifth or eighth day.

The leucocyte count here may become helpful. If this count is high (and in pneumonia it may be as high as 50,000 but is usually about 20,000), then it means that the body is reacting. After the crisis the leucocyte count falls and if it rises again, it indicates that empyema is present. In empyema the leucocyte count gradually rises and reaches above 40,000.

Pneumonia starting in the apex of the lung is for some unknown reason much more severe than are the basal cases. Delirium is present in such cases. Delirium is an important sign to lead one to think of apical pneumonia. Pneumonia with low temperature and with marked lesions in the chest is of very grave import, indicating defective resistance.

Complications.—Pleurisy occurs in all types of pneumonia and pretty often effusion is present. This is more common in children, whilst empyema is common in adults. Empyema is easy to diagnose unless it is of inter-lobar type, where the physical signs differ in every case. In most cases of empyema there is a rise of temperature with morning remissions and dullness and absence of breath sounds at the base of the lung, with displacement of the heart pointing definitely to it. If not diagnosed it may burst into a bronchus and after coughing may clear up, or run on to bronchiectasis. I have seen six cases of empyema, but all of them in adults. These cases were—empyema existing in the fourth and fifth spaces; in the other two the empyema was interlobar and once in a rare position between the base of the lobe and the diaphragm.

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Abscess of the lung is another complication or in reality a final termination of pneumonia. It may begin with hæmorrhage from the lung, followed by fœtid sputum, containing pus, elastic tissue and cholesterin crystals. The cough is paroxysmal in character and of great severity. The temperature is remittent or in pronounced cases hectic. Cavernous breathing is present in the centre of the tubular area.

Meningitis is a complication found among children, but rarely in adults. This is inflammation of the meninges over the whole cortex. Delirium is always present with Kernig's sign. This complication is mostly fatal, but I have cured one case by daily lumbar puncture, large doses of urotropin, rectal enemata of chloral and injections of anti-pneumococcus serum.

Pericarditis is also a rare complication. Endocarditis may set in, and this complication is very grave, much more so than pericarditis. The pulse here is quickened, the patient is pale, looks ill and is breathless, and complains of shivering feelings. Rigors may or may not be present. The cardiac murmur is usually absent and if present it is only found in the mitral region, being systolic in character. Embolism may occur in the legs and forearms with occasional infarcts in the lungs. Cases are also recorded of infarcts in the kidney showing intermittent albuminuria, but hardly ever are infarcts in the spleen encountered. The prognosis is very grave. Peritonitis is a very rare complication, though pneumonia following a pneumococcal peritonitis is quoted now and then.

Treatment.—Nursing is the most important factor in treating pneumonia cases. The patient should be kept completely at rest, since auto-inoculation takes place during movement. Nurses should be told that the elaborate morning ablutions must be limited to a minimum and carried out as quickly as possible. Sponging must be done every day, without disturbing, as it is comforting and does good. Only a bland diet should be given with plenty of barley water, as it helps to eliminate the toxins.

Locally, if pain with solid consolidation is present or pain from pleurisy with effusion, a linseed poultice every four hours is very beneficial, for it helps to draw the secretion out and increase the phagocytic action. In other cases where crepitations are fine and where the condition of the lung is fairly good, then Antiphlogistine should be applied once at night and again in the morning.

Medicinally aspirin is recommended by Dr. Alfred Scott. I believe aspirin combined with caffein citras and quinine, all in small doses, is most efficacious. If aspirin is given alone in large doses, I find that dyspnœa often comes on. In such cases bicarbonate of soda with tincture of rhei helps to allay the trouble.

A creosote and iodide mixture no doubt gives good results, but the drawback is that the patients dislike it. Dubois' "Syrup of Cresol" may be given in place of the creosote and iodide mixture. It also acts as a sedative.

In early cases I begin with vinum antimonalis with iodide for the first two days, followed by ipecacuanha and iodide, the latter in small doses. In intensive poisoning Warburg's tincture may be given by the rectum. It acts as a bactericide and is also a strong stimulant. Warburg's tincture can also be given by the mouth in alcoholic solution, as water precipitates the resins and thus destroys its efficacious properties. Oxygen should be always kept handy, especially in cases of double pneumonia.

In 1911 Morgenroth and Levy introduced a new drug "Optochin," a derivative of quinine. They claimed that this drug had sterilizing powers against the pneumococcus. In 1912 Wright investigated this claim and found that it was well founded. Moore published in 1921 series of studies showing that,

(1) It inhibits the growth of the pneumococcus in vitro in dilutions as high as one in a million.

(2) In mice and rabbits it is capable of protecting against a hundred minimal lethal doses of pneumococcus.

(3) Its action is best seen when given under conditions of slow absorption.

(4) It acts equally in all types of pneumonia.

(5) Its action is greater against the pneumococcus than against any other organism.

(6) Its only drawback is that it has a powerful toxic action on the body.

I have had opportunities of trying this drug. I started on gr. i. doses b. d. and even pushed the drug to grs. v. But when I pushed the dose still further I had cases of amblyopia, which cleared up without much trouble.

Hyperpyrexia is best controlled and brought down by optochin, ice-sponging or packing. Warburg's tincture per rectum with chloral is also useful.

It is of the utmost importance to watch the heart. In early cases strychnine is useful, but should not be given in those cases where signs of over-distention of the right side of the heart are present, with duskiness of the face and epigastric pulsation. In such cases the old treatment of venesection is useful. In mild cases leeches applied over the site of consolidation will also have a good effect. Digitalis should only be given if the pulse is over 100 and then too in small doses to start with. If the pulse is over 120, an injection of strophanthin should be given. If signs of heart-failure are approaching, the best one can do is to give camphor hypodermically.

A vaccine as a specific in pneumonia is useful if the right combinations of germs is known, and if it is given in the earliest stage of the disease. For this reason vaccine treatment requires the close co-operation of a pathologist in matter of grouping, but the time occupied must be reduced to a minimum. The white mouse method is very valuable in this respect. The French use the lung puncture method and this, as found during the influenza pandemic, is not a very painful procedure. Lister in South Africa has tested this procedure and found it most convenient, for it saves the trouble of keeping and carrying mice about, and the agglutination test for types is readily carried out. It has been shown by Silvestrini and Sertoli in 1900 that the pneumococcus circulates in the blood, and by Rosenau that it does so mostly after the fourth day. The idea of giving vaccines is to produce antitoxins. If, when the living pneumococcus circulating in the blood stream is not capable of causing the production of antitoxins, it is most unlikely that dead ones will. Hence vaccines after the fourth and fifth day are of no use in treatment. In America four types of pneumococcus are accepted, but not so in France, where I take it, only three types are recognised. In America Type I is taken by most of the workers as a fixed type which produces a specific anti-sera. Glym states in 1923 in the report of the Medical Research Council that no valuable evidence is available for this line of treatment yet.

Current Topics.

A Good Beginning.

THE thoughtful medical man in India realises that public health teaching should commence in the elementary schools. If every schoolboy and schoolgirl in the country could only be taught the first principles of personal and public hygiene in a simple, elementary and—above all—interesting manner, in a couple of generations the present *laissez faire* attitude of the masses in the face of immense epidemics of preventible diseases would disappear, and would be replaced by a demand for public health measures. An attempt at

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the beginning of such an excellent campaign is the institution of the Mackenzie School Certificate in St. John's Ambulance work by Sir Harry Waters, Chief Medical Officer, E. I. Ry., Allahabad.

The scheme provides for the instruction of school children in the first elements of first aid and hygiene. For the children themselves a small illustrated pamphlet has been prepared in English, Hindi, Bengali and Urdu, —(*Manual for the Use of Schools training for the Mackenzie School Certificate in St. John Ambulance*, 37 pp., price 2 annas); whilst a larger book, (*Handbook for the use of Teachers training classes for the Mackenzie School Certificate*, pp. 113, price Re. 1)—is available in English for the teachers.

Briefly, the idea of the scheme is to ground the pupil in the simplest elements of the subject, so that later, as he grows up, he may advance to the more elaborate courses. Usually the classes will be taught by a schoolmaster holding St. John's Ambulance certificates or otherwise qualified,—the examinations being carried out by a medical man. Those interested in the subject can obtain particulars and the text-books from Mr. Wall, Training College, Canning Road, Allahabad, who is Secretary to the E. I. Ry. branch of the St. John's Ambulance.

The Health Organisation of the League of Nations.

THE work done by the League of Nations is one which all thoughtful students of world-politics should study, for it cannot fail to greatly ameliorate world conditions. And of its auxiliary organisations, perhaps the most important is its Health Organisation. This comprises (1) An Advisory Council, which is an international body whose seat is at Paris, and whose special duties are to consider the recommendations of the Health Committee and to frame international health conventions. (2) The Health Committee, whose seat is at Geneva, is composed of 16 members, 9 nominated by the Advisory Council, 6 appointed by the Council of the League, and a chairman, with powers of co-opting. This body acts as advisory body on health questions to the Council, directs the technical work of the Health Section of the League Secretariat, carries out enquiries, and presents an annual report on work done. (3) The Secretariat.

How wide are the activities and the future scope of this organisation can be judged from the report of the first session of the Permanent Health Committee, held at Geneva from February 11th to February 21st, 1924. Among the members present we note the names of Sir George Buchanan, Senior Medical Officer, British Ministry of Health, representing Great Britain; Surgeon-General H. S. Cumming, Chief of the Public Health Service, representing the United States; Professor Leon Bernard, Paris University Chair of Medicine, and Dr. L. Raynaud, Inspector-General of the Algerian Health Service, representing France; and Professor B. Nocht, Director of the Hamburg Institute of Tropical Medicine, representing Germany. From the point of view of work done, this meeting was the seventh meeting actually held, the previous six meetings having been of the Provisional Committee. Thanks to the financial aid of the Rockefeller Foundation, the work had been vastly extended and measures taken to speed up exchange of public health information between different States. The system of bringing together picked men from the different health administrations of the world, and enabling them to study the sanitary organisation of one or two European countries has now been in existence for some fifteen months, and this organisation has now been so much improved that plans and time-tables can be made well ahead.

With reference to the Far East, it is proposed to set up at some convenient port an epidemiological investigation office which will collect and forward immediate information as to outbreaks of infectious diseases in the adjacent countries and especially in their ports. Recommendations were made for a sanitary convention between Far Eastern States, and a special commission has toured the Far East in order to gather information, study local conditions and report.

The Epidemic Commission in Poland and Greece has now completed its special emergency work in connection with typhus and similar problems, and has turned its attention to normal health organisation in the countries concerned, whilst also studying the problems of typhus, cholera and plague in Russia. A small fund has been reserved for use in the case of emergencies and sudden outbreaks of epidemic disease.

The sub-committee on malaria in Europe as a result of the war years sent out a questionnaire to all countries concerned and has studied the replies. A general report is being prepared, and the Albanian, Greek and Persian Governments had already asked for advice on the matter. In Persia matters are reported to be appalling; a health service hardly exists, whilst malaria, syphilis, plague, typhus, relapsing fever, small-pox, intestinal diseases, typhoid and trachoma are widespread and in places epidemic. Cattle diseases are also widespread, especially anthrax. The whole country stands in need first of a sanitary survey, which is of special importance in view of the important countries which surround Persia and of Moslem pilgrim routes which traverse the country.

A consideration of the quinine supplies of the world shews that the total 14 factories concerned have an annual world-output of 600,000 kilogrammes, but that this is wholly inadequate to the world needs consequent upon the war. A conference on the question was suggested. The sub-committee which is collecting information as to incidence and factors in cancer mortality in different countries, is working in conjunction with the different national cancer enquiries in different States, and it is hoped to here collect useful information relating to the ætiology of cancer, and as to its supposed increase in recent years,—an increase which may be partly due to better and earlier diagnosis.

The Opium Committee decided that 450 mgms. per head per year of raw opium should be sufficient to supply the world's medical and surgical needs in those countries possessing a well developed medical service, and a standard of limitation is in sight. The system of checking the various national units of anti-diphtheria serum by the international unit, of which supplies are kept at the Copenhagen Institute, is working well, and tests of the American, British and German units had found them identical. Final agreement concerning a unit for tetanus antitoxin is in sight, and half the existing American unit is suggested. Work with other sera is also proceeding.

A sub-committee is considering the organisation of international health activities with regard to labour, and anti-anthrax measures were under special consideration. A conference on the subject of measures for the control of syphilis was held in 1923 at Copenhagen, and passed resolutions advising that blood and serological tests should be carried out only by highly experienced workers in specially organised laboratories under conditions which would permit of checking results. Further, such work should be carried out in conjunction with clinical investigations in special venereal hospitals, and the provision by different States of special laboratories where such tests should be carried out by experts free of cost was advocated. A further sub-committee is working on the standardisation of biological products, and paying special attention to the conditions under which insulin is being put on the market in different countries.

It will be seen that the Committee has a very big programme ahead of it, as well as a most valuable record of work already done; and that in medicine and public health at least internationalism is not merely a pious hope but is in being.

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Bismuth in the Treatment of Syphilis.

Proceedings, Royal Society of Medicine, War Section, April, 1924, Vol. XVII, No. 6, p. 19.

In opening a discussion on this subject, Surgeon-Commander R. J. G. Parnell, R.N., Urological Department, Royal Naval Hospital, Haslar, first reviewed the previous work on the subject. In 1916 Santon and Robert successfully treated spirochætosis of fowls with bismuth, and in 1920 Sazerac and Levatidi extended this to the treatment of syphilis in man by bismuth. Reports by different workers varied, but most were agreed that the spirochæticidal effect was slow, but that clinically the bismuth compounds were very useful. Opinions as to the effect on the Wassermann reaction varied, and the effect upon neuro-syphilis appeared to be undecided. Under these circumstances, in October 1923, a thorough investigation of the value of bismuth compounds in the treatment of syphilis was undertaken at the Royal Naval Hospital, Haslar.

It was soon found that injections of the insoluble tartro-bismuthate salts were painful, that there was considerable variation in the amount of bismuth absorbed, that the spirochæticidal effect was but feeble, that the effect upon the Wassermann reaction was slight if any, and that—clinically—the effect upon manifest lesions was intermediate between that of mercury and of the organic arsenical derivatives.

Fifty-seven men were next treated by intramuscular injections of metallic bismuth into the buttock,—567 injections being given in all. A bismuth cream was used and it is absolutely essential to ensure that the needle is not in the lumen of a vein. The injections were followed by vigorous massage and were in general painless. Two cases of syncope occurred during these 567 injections, but were recovered from. Dermatitis may follow if the cream is allowed to contaminate the skin of the buttocks. The spirochæticidal effect was feeble as compared with that of the arsenical drugs when given intramuscularly, and the effects upon the Wassermann reaction were negligible. On the other hand the effects upon the manifest lesions were marked. In cases where jaundice developed after injection of arsenical drugs or where the patients were intolerant to these compounds the effects were good. The author concludes that metallic bismuth cream cannot be considered comparable in effect to the neo-salvarsan type of drugs, but that it occupies a place half-way between mercury and neo-salvarsan and is much better than mercury therapeutically. It is less toxic and far pleasanter to take than are mercury injections, is a useful adjuvant line of treatment, and of special value in cases intolerant to the arsenical derivatives.

In the discussion following on Surgeon-Commander Parnell's paper, Surgeon-Commander S. F. Dudley pointed out the difficulties attendant upon any attempts to assess the relative values of anti-syphilitic remedies. Levatidi had shewn that it was difficult to produce bismuth-resistant strains of trypanosomes, but easier to produce arsenic-resistant strains, and this might have an important bearing. Bismoxyl,—a complex of tissue extracts with bismuth,—had proved superior to metallic bismuth in the hands of the French workers, and possibly combinations of the bismuth molecule with a protein molecule might solve the problem. Major Frost reported on results with the drug in the Army at the Military Hospital, Rochester Row, and the Royal Herbert Hospital, Woolwich. It was felt that the combination of bismuth with Stabilarsan was to-day the most efficient method of treating syphilis. A number of different bismuth preparations had been tried, but—as with mercury compounds—the real value of the drug lay in its metallic content, and the choice lay between suspensions containing the metal in fine suspension and such compounds as neotrepol and bismuthyl. The suspended metal was painless if injected deeply and if no escape into the subcutaneous tissues was allowed; on the other hand bismuth oxychloride could be given subcutaneously. In the treatment of neuro-syphilis bismuth appeared to be superior to arsenic. The future position of the bismuth compounds appeared to be as an adjuvant to the arsenical derivatives,—to the exclusion of mercury.

Dr. F. Carminow Doble found that both bismuth and arsenic should be administered. As regards the different bismuth preparations he had been favourably impressed by bischlorol, spirillan and bismuthyl. He gave the drug by deep subcutaneous injections, and such injections were painless; he had even administered them to boxers just prior to their engaging in a boxing contest. In cases where jaundice or other unpleasant sequelæ followed, injections of the arsenical derivatives, bismuth were indicated.

Dr. H. Semon remarked upon the frequency of toxic effects following upon the use of the arsenical derivatives. Any efficient alternative was to be welcomed. Intravenous injections of thiosulphate of sodium could be relied upon to counteract such toxic effect, and he desired to see this new antidote more freely used.

In summing up the discussion, Surgeon-Commander Parnell said that it was obvious that—as far as our present knowledge went—bismuth was intermediate in effect between mercury and the arsenical derivatives, whilst it had the advantages of painlessness on injection intramuscularly and but little toxicity. At Haslar the course now consisted of two injections, each of 1 c.c. three each of 1.5 c.c., and three of 2 c.c. of bismuth cream, given at intervals of a week for out-patients and five days for in-patients. With salvarsan he now never exceeded a dose of 0.45 grm., and if this dose was exceeded serious cerebral symptoms might supervene. He would certainly give a trial to the arsenical antidote mentioned by Dr. Semon, viz., thiosulphate of sodium.

The Experimental Therapy of Amœbic Dysentery.

No really thoughtful physician can possibly be satisfied with the present day position of therapy in amœbic dysentery. It is true that emetine will control the disease and effect a "clinical" cure; but on the one hand relapses are very frequent, whilst on the other prolonged courses of emetine are dangerous, and the drug is one which should be used intelligently and with care.

In the issue for January 1924 of the *Journal of Pharmacology and Experimental Therapeutics,* Drs. A. W. Sellards and Lamberto Leiva record preliminary work on experimental therapy in this disease,—their paper being of special value and interest in view of the previous and well known work of Sellards on amœbic dysentery.

In vitro, they conclude, we cannot cultivate *E. histolytica* as yet, but here tests upon limax and other free living amœbæ in culture may not be without value. Here the three drugs of those tested which gave the most potent effect were emetine dihydrochloride at a dilution of 1 in 1,000,000 which caused complete inhibition of movements; quinine dihydrochloride which did the same at 1 in 100,000; and benzyl benzoate at 1 in 50,000. In vivo, experimental trials can best be made with kittens and cats experimentally infected with *E. histolytica.* Here these observers record several findings which are similar to those of Dale and Dobell, and which it is important that investigators should note. In the kitten experimental amœbic dysentery (induced by the injection high up into the colon of a freshly passed amœbic dysenteric stool full of motile *E. histolytica*) is an acute and probably invariably fatal disease. The disease differs somewhat from that in man; there is far more extensive affection of the colon mucosa, the epithelium of which tends to be shed in large amounts, but less deep ulceration than in man. The stool for instance shews far more intestinal epithelial cells than does the corresponding acute amœbic dysenteric stool in man. This tendency to wholesale

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destruction of the defensive epithelium is very liable to be followed by septic invasion, septicæmia and death from this cause. Accordingly it is exceedingly difficult —almost impossible, indeed—to cure the disease in experimental kittens.

In adult cats however, although the infection is less easily established, conditions are rather more analagous to those in man, with deeper ulceration, but less septicæmic element than in kittens, the animals live longer and treatment has more chance. Success depends on establishing the diagnosis by daily examinations of the cat's stools at the first possible moment and instituting immediate measures of treatment.

After many preliminary trials, the authors tested the effect of drugs on massive injection per rectum, the cats being held upside down for half an hour after injection in order to make sure that they retained the injection. It was found that cats will not stand more than 10 mgm. per kilo body weight of emetine subcutaneously; and not more than 30 mgm. per kilo per rectum; hence rectal injection was especially resorted to, at a dosage of from 7 to 10 mgm. per kilo weight of cat. In one experiment, of six cats injected with amœbic stool three shewed infection on the 3rd day. One—untreated—control of these three died on the 6th day of experiment and shewed severe ulceration of the gut. The other two apparently recovered under treatment, but one died 35 days later—the autopsy shewing no obvious cause of death, and the other on the 82nd day from broncho-pneumonia. Neither cat at post-mortem shewed any infection or lesion of the colon.

In one animal treated with quinine injections per rectum the response was immediate; the animal quickly recovered and remained well. In another, treated at a later stage of the disease, there was marked improvement at first, but then relapse. The authors conclude that both emetine and quinine may be of value by the rectal route, but papaverine failed. Repetition of effective doses of quinine was better tolerated than were repeated injections of therapeutic doses of emetine.

The authors state that their paper is but a preliminary contribution to the subject, but it is a useful one, and a continuance of such experimental work may shortly lead to great improvement in the treatment of amœbic dysentery in man.

The Menstrual Toxin.

THERE is a widely spread and very popular belief among all peoples of the world that a woman, during the menstrual period, can spread poison or contagion to persons and objects with which she comes in contact. Thus in the great perfumery manufacturing centres in France the women employed are not allowed to work at such a time; in the French silkworm industry they are not allowed to handle the silkworms, and in the French mushroom-growing industry they are prohibited from picking mushrooms. In an almost amazing and very interesting article in the *Journal of Pharmacology and Experimental Therapeutics* for January, 1924, Drs. David I. Macht and Dorothy S. Lubin, working at the John Hopkins University, record the results of an experimental enquiry into this matter. Their scientific interest in the subject was aroused by Professor Schick's original observation that a gift of roses sent to him by a grateful patient rapidly withered although placed in a vase of water. They had been placed in water by a female attendant in his laboratory, and on enquiry this attendant informed him that it was her experience that whenever she handled flowers during the catamenial period they rapidly withered. Subsequent enquiries by Professor Schick led him to the belief that there is present a toxin in the circulaing blood during the menstrual period, and to the experimental enquiry by Macht and Lubin. Their paper is illustrated by a very interesting series of photographs, —a withering rose which had been held in the hand of a menstruating person being compared with a control fresh rose handled by a non-menstruating person; a sweet pea exposed to menstrual toxin drooping and withered, as compared to a normal one not so exposed, and so forth.

The authors, after a prolonged series of experiments, conclude that the blood serum, blood corpuscles, saliva, sweat, milk and other secretions of menstruating women contain a toxic substance characterised by specific pharmacological and chemical reactions,—a *menotoxin*. This menotoxin is very much more powerful in its effects on plant protoplasm than on animal tissues, and its nature and properties can be best studied by phyto-pharmacological methods. Its amount varies in different individuals, and it occurs in the largest quantities in the blood serum just before the onset of and during the first few days of menstruation. It has an inhibitory effect on the growth of roots and stems of whole living seedlings, a blighting effect on cut flowers, and a distorting effect on the geotropic properties of seedlings, through its inhibitory influence on the growth of yeasts and through other phenomena.

Microscopically it was found that menstrual serum was found to be more deleterious on protoplasmic streaming and the consistency of plant protoplasm than normal serum. Animal tissues are far less susceptible than are plant tissues, yet the results here conform with these for plants, but shew weaker action. The menotoxin is fairly resistant to heat and to the action of bacteria, and its presence can be demonstrated in dried blood. It is not dialysable, but can be extracted to a greater or lesser degree by alcohol, chloroform, ether and acetone. Endocrinologically it is probably intimately correlated with the physiology of the ovary and corpeus luteum, whilst chemically it exhibits properties which point to its possible relationship to oxy-cholerterin.

"The experimental data obtained by the authors in the study of menotoxin confirm in a striking degree the empirical observations concerning a menstrual poison prevalent in folk-lore and handed down in classical literature," they write.

Abdomino-Vaginal Excision of the Rectum.

IN the *Lancet* for March 22nd, 1924, Dr. Victor Bonney, M.S., M.D., B.SC., F.R.C.S. (Eng.), records details of an interesting and novel surgical procedure. An elderly female patient was sent to him with a mass lying behind the uterus. When the abdomen was opened the mass proved to be a carcinoma of the rectum, about an inch above the bottom of Douglas's pouch. The middle line wound was closed. Colostomy was performed as high up the pelvic colon as possible, and the operator was then left wondering what was the best way to deal with such a growth in a feeble woman between 60 and 70 years of age, who would probably not stand the shock of a classical abdomino-perineal resection. The following procedure was adopted:—

"I first packed the vagina with gauze soaked in violet-green as though for a Wertheim's operation, and then, reopening the middle-line incision, crushed and divided the bowel below the colostomy and separated it down to the upper surface of the levator, following thus far the technique of my friend and generous teacher, Mr. Ernest Miles. The uterus being pulled upwards and forwards, I then, with a scapel, divided the whole length of the posterior vaginal wall by cutting on to the gauze packing. The gauze packing was then pulled out via the vagina by an assistant. I had previously tied a strong piece of sterilised string around the upper end of the detached segment of bowel, and this was passed on a forceps through the incision into the vagina where it was seized by the assistant, who, pulling upon it, pulled the whole length of freed bowel out through the vulva.

I then made a peritoneal floor exactly as though I was performing abdomino-perineal excision, except that it was far more easily and neatly done, as there was no

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mass of bowel to sew over, but, instead, a deep empty hole between the back of the vagina and the face of the sacrum. The abdominal wound was then closed.

The patient was now placed in the lithotomy position with the freed bowel hanging out of the vagina, and I found there was length enough of bowel below the growth to enable me to crush and divide the bowel about two inches from the anus. I proceeded to do this and then inverted the ligatured end by a purse-string. Finally, the hole in the posterior vaginal wall was closed by a continuous catgut suture, a small gap being left at its lower end, through which a tube was passed into the empty space behind the vagina. The operation was relatively easy and rapid, and except for a little bleeding from the vaginal wall there was no hæmorrhage to speak of and no shock, and she recovered well.

I am not aware of this method having been described before, and my object in recording it is to suggest it as an alternative to the classical operation. The superior ease with which the gap left by the removal of the bowel from the hollow of the sacrum can be roofed over by peritoneum is very marked, especially by contrast with those cases of abdomino-perineal excision, where the detached bowel is hypertrophied and full of flatus. The avoidance of the perineal incision and the cutting of the levators, which is the stage where most of the shock and bleeding is incurred in the abdomino-perineal operation, is also a great gain, and where the growth is above the level of Douglas's pouch (and it is for such cases that the operation is specially suitable), the non-removal of the last inch or two of the bowel will not materially affect the patient's chances of cure.

If it be desired to remove this last two inches, the middle line incision in the posterior vaginal wall could be carried down to the vaginal orifice and continued round the anus from that point, thus minimising the extent of the perineal wound and avoiding the excision of the coccyx."

Examinations for Life Insurance.

We have received from the Oriental Government Security Life Assurance Co., three small booklets, which we wish that the extreme pressure upon the space at our disposal permitted us to annotate upon more fully. The first is issued as a jubilee publication and tells the story of the inception and history of the Company, founded in 1874, and the first to undertake insurance of the lives on Indians, up to its jubilee this year. It is an interesting and stimulating record. Beginning with very small origins in Bombay, it has now opened branch offices in most of the large cities of India, and is doing a thriving business. The history is here told of how in turn the Bombay plague epidemic, the special problems of the war, and above all the heavy demands consequent upon the mortality due to the great influenzal pandemic were encountered and overcome. In 1923 the business of the Company had so expanded that Rs. 49,19,976 was paid out in claims; there were 88,147 policies in force totalling a sum assured of Rs. 17,70,53,246; and funds of Rs. 6,12,23,922. The whole story is one of very great interest and vigorous enterprise.

The second and third booklets are by Dr. J. J. Cursetji, M.D. (Lond.), Chief Medical Officer to the Company, and constitute full and abridged editions of a book entitled "A Pocket Guide Book to Medical Life Assurance." The full edition is intended for use at headquarter offices, the abridged one for use by medical men called upon to do examinations for life insurance. The chapters deal with preliminary suggestions, medical examination of the applicant, family and personal history, present condition, and environment, expectancy of life, etc., whilst there are several appendices and statistical tables. The book is written in a straightforward manner and is well up to date, including the results of the lessons learnt during the war, and the most recent auscultatory methods of estimating blood pressure. The author has been connected with life insurance work for 15 years, and this little volume appears to be exactly what is wanted by the mofussil physician who has to undertake such examinations for life insurance,—work in some instances with which he is not familiar.

A Cultural Method for Leishmania.

A paper "On the Cultivation and Biological Characters of *Leishmania tropica*" by Dr. I. J. Kligler in the January 1924 number of *The American Journal of Tropical Medicine* will interest laboratory workers in India, both in connection with oriental sore and kala-azar. The growth of *L. tropica* in N.N.N. medium is relatively short lived, and in order to maintain a strain alive, frequent sub-cultures are necessary. On searching for more suitable culture media, Dr. Kligler finds that the following modification of Noguchi's medium for leptospira is very satisfactory.

"One per cent. dextrose agar is melted, and 10 parts are mixed with 90 parts of saline. The diluted dextrose agar is distributed into tubes (5 or 10 c.c. per tube) and sterilized. This constitutes the basic medium and may be kept indefinitely. Immediately before or just after inoculation, fresh sterile rabbit blood is added to each tube in the proportion of 1 to 10."

The cultures are inoculated with material taken under aseptic precautions in the usual manner with a capillary pipette. The culture tubes are covered with sterile paraffin oil and incubated at 25°C. In septic tubes, contaminating bacteria cause changes in the colour of the blood medium, and these should be discarded. Tubes which remain free from bacteria gradually undergo hæmolysis and a positive culture can almost invariably be recognised by the bluish-black appearance of the medium and a watery bluish tint of the paraffin oil when looked at from above. Growth was obtained at a pH range of from 7.0 to 7.6 but was best at a pH of 7.2. The parasite is an obligatory ærobe.

Such cultures will survive for three months and even longer. The paraffin oil prevents evaporation of the medium and rapid changes in reaction. Sub-cultures should be made about once in every six weeks.

In a few preliminary experiments the effect of different substances on the flagellate form of *L. tropica* was studied. Graduated amounts of solutions of different strength were added to tubes containing 5 c.c. of neutral ascitic fluid and 1|10th of a c.c. of positive culture added to each tube. The following were the results:—

Tartar Emetic—No growth with 1 in 20,000 in two weeks: no growth with 1 in 10,000 in 120 weeks (2nd expt.).

Brilliant Green—No growth with 1 in 200,000 in two weeks.

Salvarsan—No growth with 1 in 20,000 in two weeks.

Neo-salvarsan—No growth with 1 in 25,000 in two weeks.

Cultures in all higher dilutions and controls all positive. These results would appear to indicate that possibly brilliant green may be ten times as leishmanicidal as is tartar emetic. It is, however, very toxic.

In a postcript, the author adds that for sub-cultures the original Noguchi medium for leptospira proved even better than the above modification,—the cultures remaining alive for at least six months without transfer. Noguchi's leptospira medium consists of:—8 parts of 0.9 per cent. saline; 1 part of rabbit serum; 1 part of 2 per cent. nutrient agar, and 0.2 parts of rabbit hæmoglobin, made by adding 3 c.c. of distilled water to 1 c.c. of rabbit blood.

Dr. Kligler's paper may prove very useful to workers in India.

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Reviews.

CANCER, HOW IT IS CAUSED, AND HOW IT CAN BE PREVENTED.—By J. ELLIS BARKER, 1924. London: John Murray. Pp. 432. Price 7s. 6d.

When the layman takes to writing a book about a medical subject, but few qualms or doubts beset him, and he will rush in where a mere humble doctor would fear to tread. Mr. Barker is a well-known publicist who has written on the enigma presented by modern Germany, on the still more difficult problems of "economic statesmanship"—if such a thing really exists; and now, apparently, he has found the leisure in which to solve the cancer problem which has defied for so many decades the enquiries of so many distinguished investigators, and to present to the world his doctrines as to how it is caused and how it can be prevented. And his book opens with a highly laudatory introduction by Sir Arbuthnot Lane; "I feel," he writes, "that this book will bring a new hope and a new happiness to humanity, and that it will dispel the depression and despair which have settled upon millions of people who are haunted by the fear of being slowly tormented to death by a disease, which is the despair, not only of the sufferer, but also of the medical men and of the scientists who at present are practically helpless. Mr. Barker has shown us the way to conquer cancer. Let us listen attentively to what he has to say, and let us support him with the utmost energy and enthusiasm". Enough said, or at least, quoted. We will follow such good advice.

The book opens with a chapter on "the horror and mystery of cancer" which will impress the layman, but which contains but little that the medical man is not already familiar with. The author then claims that "the cancer problem is the despair of the scientists" quoting distinguished American, French and British authorities in support of this pessimistic contention. Beriberi, for instance, he claims, remained a mystery for many years; now we know all about it, that it is a food-deficiency disease; so also is cancer. We are not so certain; it is still uncertain even whether beriberi is a food-deficiency or a food-intoxication disease. Also we deny *in toto* that the cancer problem is the despair of the scientists. The problem is an exceedingly difficult one, but information and experimental evidence with regard to it are steadily accumulating, and we may not be so far from the real solution as many persons imagine. If the publication of Mr. Barker's book does anything to lessen the support which so splendid a work as that of the British Cancer Research Bureau at the Middlesex Hospital in London is receiving, it is to be thoroughly deplored. The ætiology and causation of diseases are not usually discovered by mere accident; the enquiry demands skilful and laborious investigation.

Cancer is essentially a disease of civilisation, the author next claims, a fact which everyone knows; and it is almost unknown amongst primitive tribes,—an assertion which is perhaps open to doubt. The American Indians, for instance, are celebrated for their longevity and are also almost entirely free from cancer. But the truth is that in reality we know far too little of the diseases prevalent among primitive tribes to make such sweeping statements: they are so remote from modern medical facilities that our ignorance about their diseases is profound. It may impress a layman to read that Sir William MacGregor, who was for 9½ years Governor of British New Guinea, never saw a case of cancer in that period, but such evidence is merely of negative value. However, the point that cancer is essentially a disease of civilisation and that its incidence in Europe and America is on the increase, must be admitted, since all the evidence is in favour of such a view. Even the British Ministry of Health admit the increase in cancer in Great Britain in recent years; thus the deaths per million of the population from cancer in England and Wales have increased from 327 in 1851-60 to 1,229 in 1922; whilst in America the increase is still more rapid; and Mr. Barker comments on the very high incidence in damp countries such as Holland, with a cancer mortality of 106 per 100,000 per annum of the population.

What the author does *not* stress, however, are the figures for Switzerland, a cancer mortality which heads the list at 124 per 100,000 of the population. Why should this be, seeing that Switzerland has the finest climate in the world? Perhaps we may offer an explanation which has been overlooked by Mr. Barker. Switzerland is the sanitarium of Europe, and many thousands of invalids from every variety of disease flock annually into this small but favoured country. The result is that the medical profession in Switzerland consists of a body of highly trained specialists, second perhaps to those of no other country in the world; skilled diagnosticians and expert scientists. Thus the combination of a large influx of invalids and of expert medical diagnosis raises the cancer mortality of Switzerland to that of the highest in the world. We suggest that the same applies to the increase in the cancer statistics for America and the British Isles, that much of it is due to improved diagnosis. That there has been a real increase is admitted by the British Ministry of Health, but they deny that the *whole* of the recorded increase is a real one.

We next learn that cancer is not due to injury, old age or irritation, and here the argument wears very thin indeed. Cases are actually quoted where the site of an injury has become carcinomatous many years after,—the long interval before the onset of the cancerous condition being brought forward as evidence that the trauma had nothing to do with it. Irritation is universal, but cancer is not; were irritation the true cause of cancer, the millions of men who shave themselves daily with blunt razors should develop cancer of the face. It will be seen how easily and lightly our author, mounted upon a favourite hobby horse, clears his fences and romps home an easy winner. Chronic poisoning and not irritation, he concludes, is the true ætiological factor in cancer. Cancer is due to chronic poisoning plus vitamine starvation, starvation of which vitamine we are not informed, but apparently of vitamine C. Chronic arsenical poisoning over many years may lead to cancer of the skin; therefore *x*-ray carcinoma must be of the nature of a chronic poisoning.

Once admit this fundamental hypothesis, and all is plain sailing, and, as is to be expected, the author next expounds the doctrine that cancer is due to chronic poisoning from intestinal stasis. And here, set forth in all its lurid detail for the layman to read, is the full gospel of visceroptosis and "kinks," the tragic fact that Nature has made such a mess of human anatomy as to present man with a cesspool of a colon. Here the author's narrative is clear and, also, largely convincing, since he is dealing with what is almost certainly true and very generally admitted; there is but little doubt that constipation and visceroptosis play a large part in the ætiology of carcinoma of the colon, although many pathologists would interpret this factor as one of chronic irritation rather than of chronic poisoning. We would hardly go so far, however, as to agree with the author that all chronic diseases are but symptoms of chronic constipations; tubercular enteritis, for example, is usually associated with diarrhœa.

Whilst admitting freely the importance of intestinal toxæmia as a disease-inducing factor in connection, not only with cancer, but with many other diseases; what is the connection between chronic constipation and cancer of the breast, of the cervix uteri, of epithelioma of the penis or *kangri-burn* epithelioma? It is at this point that the whole-hearted adherent of the constipation-cancer theory is up against difficulties, and hence we have

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introduced the vitamine-deficiency factor, although rather vaguely sketched. There is some mystical but close connection, our author claims, between the intestine and the female breast, though what it is he does not explain, and scientists are unfortunately still ignorant of it. Dr. Victor Pauchet, in *Le Colon Homicide*, states that 9 out of every 10 women suffering from cancer of the breast are constipated; but are not 9 out of every 10 civilised women constipated? It is at this point that the constipation-cancer theory fails; in fact a supporter of the chronic irritation theory could probably take this very useful little book of Mr. Barker's, with its valuable statistical tables, its mass of data and illustrative cases, and interpret almost every page of it as strongly supporting his view.

After a diversion to the subject of chemical poisons and cancer, the author passes to chemical preservatives in food as a further cause of chronic poisoning and cancer. Here there is some straight-forward and vigorous writing in what is the best section of the book. Mr. Barker inveighs vigorously against the modern food-trusts, the adulteration of almost every article of food and drink partaken of by modern civilised man, the chronic poisoning of peoples wholesale for the benefit of monopolies, and every medical man will here cordially support his campaign for a return to pure foods and drinks. Vitamine starvation is not merely a vague theory; it is a national and almost universal fact among civilised populations, and it is playing havoc with the civilised races.

Finally, the author passes to a consideration of the faulty habits of dieting and life which make constipation almost universal among civilised communities, and preaches the lesson of the simple and healthy life which he himself follows. Again there is here much sound and sane writing which is of educational value for the public, and which we welcome.

Despite our criticism of Mr. Barker's book, we consider that the volume is still a welcome one. It is a digest of useful information and full of quotations from leading authorities, illustrative cases, and statistics, and constitutes a useful book of reference for every medical man interested in the cancer problem. The book is certain to be widely read, and if its teaching of a return to the simple life and healthy habits in dieting and living be widely followed, its publication can do nothing but good. On the whole, however, we do not consider that it carries us a single step forward towards the solution of the cancer problem, and should its publication do anything to weaken the strenuous efforts now being made in every civilised country to discover the real causation of cancer, we would deplore it. To parody an old saying, we doubt whether an apple a day will keep cancer away.

R. K.

GYNAECOLOGY WITH OBSTETRICS; A TEXT-BOOK FOR STUDENTS AND PRACTITIONERS. By John S. Fairbairn, M.A., B.M., B.Ch.Oxon., F.R.C.P. Lond., F.R.C.S Eng., etc. Oxford Medical Publications. London: Oxford University Press. 1924. (Demy 8vo, pp. xxii+ 769; 129 figures. 5 plates. 25s. net)

The aim of the author of this text-book has been to treat the two subjects of gynæcology and obstetrics together, and to show how mutually inter-dependent they are; but over and above all this to demonstrate that they are integral with general medicine and surgery. The subjects have been presented on entirely original lines, at least as far as the general run of text-books are concerned. Stress has been laid on the preventive side as opposed to the curative side, in accordance with the more modern trend of medical science.

The public health, national, and medico-legal aspects of obstetrics and gynæcology are most satisfactorily dealt with. The whole book is written in an extremely interesting manner and is quite one of the most fascinating text-books on any subject that it has been our good fortune to read. Instead of the usual repetition of stereotyped facts and theories so often copied from book to book which compose the majority of text-books, the subject matter has been treated in the most unconventional, interesting, and characteristic style. There is no question as to the high ideals of teaching embodied in this work, and the whole trend is eminently sound and thoroughly useful as well as practical, as one would expect from such a well-known and widely experienced teacher of the subject. The pathological classification as originally suggested by Professor Fothergill, has been adopted in the gynæcological part. This certainly appears to be the best and most logical one, although in some ways it may at first appear to be not quite so convenient as the old anatomical one. The book is one that can certainly be not only highly recommended to students, as quite one of the best and soundest text-books on obstetrics and gynæcology, published at a most moderate cost, but it is also one that should be, and certainly will be, very widely read by those engaged in general practice and also by teachers and specialists alike. The proportion of space allotted to the various sections appears to have been most judiciously distributed and all speculative theory has most wisely been reduced to a minimum. In conclusion, one can only add that it is a most suggestive and stimulating work and it cannot fail to do much to put these subjects on the best possible basis and its teaching and precepts, if followed, must help to reduce both the maternal and infantile mortality which unfortunately stand at such a high figure in this land.

There is one criticism we are inclined to offer; viz:—would it not have enhanced the value of the book had there been more and better illustrations in the text? Those there are few in number and in some cases, at least, appear to leave something to be desired. The printing and general "get up" of the book are well up to the high standard of the publishers who are responsible for its production.

J. C. H. Leicester.

A MEDICAL GUIDE TO THE PRINCIPAL BRITISH SPAS AND CLIMATIC HEALTH RESORTS. 1924-25. 90 pp. London, Messrs. J. and A. Churchill. Price 1s-net.

This little handbook will be found very useful by the many medical practitioners in India who are called upon from time to time to advise patients returning to the British Isles as to the selection of where to live or where to go for treatment; whilst it will also attract those who are making plans for a pending retirement from service. It is fully illustrated and the information given is exceedingly complete. An introductory chapter on the choice of waters and climates, and the general indications for spa treatment is followed by a detailed account of marine and then of inland health resorts. A useful alphabetical guide to hotels and hydros is then followed by some 60 pages of illustrated advertisements, giving full details. There must be many persons in India either meditating a trip home, or retirement, or the advising of a patient as to where to stay, to whom this little brochure will be extremely useful.

PEDIATRICS.—By various authors. Edited by Isaac A. Abt, M D, Professor of Diseases of Children, North-Western University Medical School, Chicago: Attending physician, Sarah Morris Hospital for Children of Michael Reese Hospital, Chicago. To be completed in eight volumes Vol. I, with 284 illustrations. Vol. II, with 180 illustrations. Sold in complete sets only. London & Philadelphia: W.B. Saunders Company, Ltd. Price £18 per set of 8 vols. pp. 1240.

The first two volumes of this monumental work on pediatrics have appeared. About 150 writers have lent their services and all of them are experts in the

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subjects with which they deal. The work consists of a collection of monographs on the diseases of children and on every subject which is related to the physical and mental welfare of the child.

The first volume deals with the history of pediatrics, hereditary influences, anatomy, growth, development, nutrition and hygiene, and a vast amount of authoritative information on each of these subjects has been accumulated in the 1240 large and closely printed pages of the volume.

The second volume deals with infant mortality, diagnostic methods, treatment and prophylaxis in general, feeding, disorders due to faulty metabolism, food deficiency and constitutional diatheses. It is impossible to review a work of such proportions in detail. Like all other books of the kind it is somewhat uneven, though special care has been taken to ensure co-ordination between the writers. The articles on diet diseases are of special interest, that on infantile beriberi is by Vedder and naturally it is written strictly from the point of view of vitamine deficiency, no other view is seriously discussed. Nearly all the contributors are American. Every specialist in children's diseases and every large medical library will be compelled to obtain a set of these volumes. Even the general practitioner who desires to be equipped with the fullest and latest information on the subject of children and their diseases will find it desirable to subscribe to this work.

DISEASES OF THE SKIN.—By Richard L. Sutton, M.D., LL.D., 5th edition, Revised and enlarged, 1923. St. Louis: C. V. Mosby Company. Pp. 1924. Price $ 10.00.

THE number of books on skin diseases is astonishing. Many of them are of about the same size, scope and price: it is difficult to make a choice between them when one can afford only a single book on the subject. Dr.Sutton's book has reached a fifth edition, it has established itself in the front rank of the books on skin diseases and it has been brought thoroughly up to date. The illustrations are more than a thousand in number, they are of a high degree of excellence. There are eleven coloured plates. Special attention has been given to subjects which are often scantily dealt with in books on skin diseases. Drug eruptions are well described and illustrated, so are some of the exanthemata. Measles has not received its fair share of attention perhaps, while foot and mouth disease receives special consideration, and has two coloured plates allotted to it. The Rocky Mountain fever is described but the rash is dismissed in three lines. The tropical skin diseases are much more fully dealt with than is usual in such books. Leprosy, yaws, ulcerating granuloma of the pudenda are well described and illustrated. Dr. Sutton's book can be recommended as a thoroughly reliable guide to the difficult subject of skin diseases.

HANDBOOK OF SKIN DISEASES.—By F. Gardiner, M.D., B.Sc., F.R.C.S.E., F.R.S.E. 2nd edition, 1924. 248 pp. 12 colour plates and 46 black and white illustrations. Edinburgh: E. and S. Livingstone. Price 10s. 6d. net.

THIS is an admirable little book, and of special value both for the medical student and the general practitioner. Whilst not ambitious in scope, it is written in a straightforward style, and the illustrations are excellent, especially the colour plates. The commoner diseases are taken first, especially those most commonly encountered in general practice. The chapters deal with streptococcal and staphylococcal infections, diseases due to animal parasites, seborrhœa, psoriasis, infections of the scalp, urticaria, erythema and allied conditions, dermatitis, bullous eruptions, diseases due to light, pruriginous eruptions and lichen planus, the pityriasis group, the tuberculides, pigmentary changes, hypertrophies, warts and keloids, neoplasms and the syphilides. It will be seen therefore that, despite its small size, the book is quite comprehensive. The colour plates vividly illustrate such conditions as impetigo contagiosa, ecthyma, seborrhœa corporis, psoriasis, tinea barbæ, favus, erythema nodosum, dermatitis herpetiformis, tuberculides, erythema induratum and lupus erythematosus. The author and publishers are alike to be congratulated on the production of this useful and valuable second edition.

REPORT OF THE PROCEEDINGS OF THE FIFTH ENTOMOLOGICAL MEETING, HELD AT PUSA, 5TH TO 10TH FEBRUARY, 1923. Edited by T. Bainbrigge Fletcher, R.N., F.L.S., F.E.S., F.Z.S., Imperial Entomologist. Calcutta, Supdt. Govt. Printing, 1924. 422 pp. 37 plates, many in colour. Price Rs. 9-8-0.

THIS admirably got up report will interest a very wide circle of readers. Its various 61 included papers deal with crop pests, forest entomology, medical and veterinary entomology, household and store pests, lac, sericulture, insect life-histories and bionomics, methods of collecting and preserving insects, systematic entomology, entomological organisation and publicity and a short miscellaneous section. Of the papers of strictly medical interest, we may mention one by Mr. M. O. Y. Iyengar on the occurrence of a coprid beetle in human fæces, and another by the same author on the much discussed subject of animal prophylaxis in malaria; observations on the bionomics of *Aëdes* (*Stegomyia*) *albopicta* by Mr. S. K. Sen, and a note by Mr. Bainbrigge Fletcher on the uselessness of carbon bisulphide as a mosquito larvicide.

Of more general and public interest are the paper by Major R. W. G. Hingston, I.M.S., on the evolution of the faculty of communication in ants—a most admirable study of insect life, and full of detailed observations; and Mr. Fletcher's appeal for co-operation in the wide fields in which a knowledge of entomology is important in India, and a note on publicity methods. The whole volume is one which will appeal to many different types of specialists with widely varied interests. It is well indexed, and well bound. Its numerous colour plates are a feature of special value.

The publication of this report leads us to wonder why so large an organisation as the annual Indian Science Congress can apparently afford only to publish its proceedings in very abbreviated form under the ægis of the Asiatic Society of Bengal. Even at Rs. 10 a volume, such an annual publication would be very welcome and would ensure full publication of valuable papers.

METHODS IN MEDICINE. THE MANUAL OF THE MEDICAL SERVICE OF GEORGE DOCK, M.D., Sc.D., formerly Professor of Medicine, Washington University School of Medicine. By George R. Herrmann, M.D., Ph.D., Instructor in Medicine, University of Michigan. St. Louis: The C. V. Mosby Co. Pp. 521. Price $ 6.50.

EFFICIENT organisation is at least one important factor in success in medical practice, whether in institutions or in private practice, and this manual represents a system which has proved successful in the medical clinic of Professor George Dock at the Robert Abbott Barnes Hospital, St. Louis. The book is divided into five parts, and is extraordinarily complete and thoroughly up to date.

Part I is made up of administrative methods, rules for procedure and regulations to ensure the prompt, careful, complete and uniform handling of each case. These methods include an account of the duties of the resident staff from the resident physician to the clinical clerks; notes and suggestions for taking the case-history, physical examination and laboratory work, with the routine requirements for each type of case and the details of the ordinary clinical laboratory procedures. Part II consists of the special methods of

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clinical and laboratory investigation applied in a more complete study. Part III outlines accepted therapeutic methods, with emergency methods, and subsequent treatment and management. Part IV contains approved dietetic methods and practical diet lists, and Part V illustrates recording and graphic methods in the form of a complete history, with representative charts of data from the usual types of cases.

The book is full of excellent matter. "Some important things for house men to remember" is full of wise advice; "in giving out information in regard to patients, be honest with their friends, but tactful" is an excellent aphorism, but one difficult of realisation. Chapter 5 details rules for the X-ray department; chapter 10, in 30 pages, gives a succinct account of routine laboratory methods. Physiological chemistry receives very full attention throughout the volume. Five chapters are devoted to diets, including a very full consideration of the treatment of diabetes,—diets permissible at different stages, and insulin therapy. The chapters on emergency measures are clear-cut, and useful for immediate reference.

Chapter 29, "Dock's twenty drugs," is an attempt to teach the student the proper use of a few selected and reliable drugs, rather than to confuse him with half the pharmacopœia. Finally comes a very complete section of special forms of charts, case records, laboratory examination report forms, etc., in use.

The medical administrator will find much valuable information in this volume; the house physician and resident will scan its pages with interest, whilst it will be helpful even to the general practitioner.

AIDS TO MEDICAL DIAGNOSIS. By Dr. A. Whiting, M.D. 3rd, 1924 edition. London: Bailliere, Tindall & Cox. Pp. 177. Price 3s. 6d. net.

THIS small handbook, which has already run to a third edition, is very well got up. The popularity of the "Students' Aid Series" is in itself a testimony to their usefulness; and for the medical student reading for his final examination such books as this are exceedingly useful. In this volume, however, Dr. Whiting does more than write for the student preparing for examination, for the general practitioner will find in it everywhere a means of refreshing his memory. The outline followed is the usual one of first general clinical investigation of the case, then infectious diseases, and then the diseases of the different systems. The writing is clear and easily followed; the book is not merely an abstract from larger text-books, but an original work and full of real "aids" from clinical experience. Tropical diseases are not dealt with,—as they form the subject of a separate volume; but the general field of medical diseases is well covered. The book is one which we can cordially recommend.

EXERCISES FOR HEALTH AND CORRECTION. By F. D. Dickson, M.D. and R. L. Diveley, M.D. 127 pp. 112 Illustrations. London: J. B. Lippincott Co., 1924. Price 8s. 6d. Obtainable from Messrs. Butterworth & Co., Calcutta. Price Rs. 6-6-0 net.

THIS sumptuous little manual fills a long-felt want. It is not written to exploit some special cult or system; neither does it attempt to deal with such conditions as scoliosis and ankylosis, where exercises should be carried out under skilled and trained supervision. On the other hand, it is essentially a book for the general practitioner, and above all, one that he can put into the hands of his patients for their self-instruction. The written text is brief—the profuse illustrations giving a much clearer explanation than would pages of text. All of them are photographs, shewing the exact movements to be undertaken.

There are five sections in the book:—(1) Bed exercises to be carried out by the patient who is debilitated after long illness: (2) Exercises for improving general tone and stamina,—setting up exercises: (3), (4), (5) postural exercises for children, for adults and for the spinal treatment of poor carriage, visceroptosis, the training of defective muscle groups and for foot conditions where lack of muscle balance is present, such as flat-foot and fallen transverse arches.

We have nothing but praise for this little book, which will be welcomed by general practitioners, patients, school teachers, Boy Scout, Girl Guide and similar organizations, and which should appeal to a wider circle of followers of the cult of fitness.

Annual Reports.

INDIAN RED CROSS SOCIETY. ANNUAL REPORT FOR 1923. SIMLA.

UNLIKE some annual reports which we are called upon to review, this report is very readable and exceedingly interesting. The reason is that the main report in narrative form is by Sir Frederick Whyte, Chairman of the Managing Body, and a fluent writer. The work of the Indian Red Cross during the war was splendid; there is no other word for it, and every medical officer with Indian troops encountered its beneficial activities on every side. But in a post-war world, or one which is nominally such, Red Cross problems differ in times of peace from those to be faced in time of war, and the year 1923 saw the transitional period of post-war organisation ended, the new peace policy clearly defined and outlined, a vigorous campaign embarked upon, and—most important of all—close touch with the central League of Red Cross Societies, organised at the Cannes and Geneva conferences. The entire League now comprises 42 different but co-ordinated national organisations.

The three main objects which the Indian branch has to face in times of peace are (1) the pressing need for popular health instruction in a land where utter ignorance of such subjects is far from spelling bliss; (2) the improvement of public health nursing, and (3) junior Red Cross organisation. Finally a short experience of conditions in India is sufficient to shew that, with regard to public health work, the closest possible co-operation with the other various sister bodies engaged in public health work is essential.

Turning to the first of these objects, in the first place there has been a large output of booklets, posters, and material for propaganda work, both in English and in the vernaculars. The National Baby Week was inaugurated during the year by Lady Reading, and the Red Cross Society took its full share in making this institution a success, supplying Rs. 10,000 in cash, and the help of an army of workers. We have so often dwelt upon the subject of infant mortality in India that we merely leave the latest figures to speak for themselves: rates of 800 in Poona, 580 at Cawnpore, between 500 and 600 in Bombay, and 330 in Calcutta. During the year, the Organising Secretary, Lieutenant-Colonel H. Ross, C.I.E., I.M.S., visited all the branch societies with the exception of Burma, and the Bombay and Madras provincial branches organised at least one Red Cross centre in every district, drawing upon a central provincial centre. At present, however, there is too much tendency to rely upon officials for organisation and management, and the enlistment of further non-official Indian representation is vital. Public health propaganda work can only be carried out by organisation of provincial and local bodies, each taking action in its own locality. Local problems and factors may vary widely.

The expenditure on the supply of comforts to both military and civil hospitals continues to expand annually, and one of the most important events of the year was the opening of the fine central Red Cross Depôt at Lahore, erected at a cost of Rs. 1,19,322, a depôt which

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August 29, 1922.

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The Lancet, **February 24, 1923, p. 382.**

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has been drawn upon by all India from Peshawar to Mercara, and from Calcutta to Aden. This central depôt purchases wholesale and can supply the requisitions of provincial and district centres more cheaply, efficiently and rapidly than such stores can be obtained elsewhere. Printed lists of stores available can be obtained on application to the Superintendent, and the railways have granted the valuable concession of free transport from Lahore to all parts of India.

The annual reports of the different provincial branches are included as separate items, and it is here of course that one gets down to the details of the volume of work accomplished. Schools are supplied with posters and literature on health subjects, and child welfare centres are working in every important centre. The expansion of the child welfare movement is being restricted solely by the lack of suitable trained Indian welfare nurses. It is in South India that the most rapid progress has been made; Madras city has a regular network of child welfare centres, and the trained nurses are so popular in attendance on maternity cases that more and more of the untrained indigenous *dais* are coming forward for training, as they find their means of livelihood threatened. In Northern and Western India the progress made has been more up-hill, but wherever the movement spreads it arouses public confidence and interest among the people.

The number of members improved from 428 in 1922 to 2,107 in 1923. The Bihar and Orissa Committee distributed broadcast a small brochure explaining the objects of the Society in simple language with the result that a sum of some Rs. 20,000 in the form of membership subscriptions was quickly collected. The very successful Red Cross Week held in Bombay in December, 1922, realised a profit of 10 lakhs, a sum which enabled Lady Lloyd as an experimental measure to appoint a special Red Cross lecturer, Dr. Dhanjibhoy of Baroda, to tour throughout the presidency. His efforts were exceedingly successful, a sum of Rs. 4,559 in membership subscriptions alone having resulted, and a second lecturer is about to be appointed in addition. Several of the Indian States in the Bombay Presidency have started centres. The admirable work of the Bengal Provincial Branch has already been commented on in our review of the annual report on the hospitals and dispensaries of that province.

Financially the Society is on a very sound basis. The income during 1923 was Rs. 4,04,403 and the expenditure Rs. 3,85,333. The total assets stand at Rs. 64,28,404, including Rs. 52,12,378 in 1929–1947 War Loan.

The Managing Body of the Indian Red Cross Society are to be heartily congratulated on this report, which is of interest to every medical worker in India. Immense as are the problems to be faced, they are met squarely in the face, studied, and the whole campaign well thought out and carried into execution. Granted a continuance and expansion of such activities over the next ten years, with the very influential backing which the Managing Body receives, and in the background the backing of the central League of Red Cross Societies, we may see a material reduction in the Indian infant mortality and the awakening throughout the land of a public health conscience.

ANNUAL PUBLIC HEALTH REPORT, ASSAM, 1923. BY MAJOR T. D. MURISON, I.M.S., SHILLONG, ASSAM, GOVERNMENT PRESS. PRICE 12 ANNAS.

The Assam Government are to be congratulated upon this report, which shews that the long years of spade work in public health matters in the province are at last beginning to bear fruit. Incidentally also, it covers the last year of the long period during which Lieutenant-Colonel T. C. McCombie Young, M.D., D.P.H., I.M.S., has been associated with the province,—a period during which its most efficient kala-azar survey staff has been built up, and full measures taken to control the disease. Colonel McCombie Young proceeded on long leave on November 16th, 1923, and Major Murison took over charge on the 1st December. But although Colonel Young's long and vigorous period of administration of public health matters in the province may now have come to an end, his labours will not be forgotten, either by the doctors of the many tea gardens whom he assisted in their anti-kala-azar measures, or by the medical fraternity in the province generally. In Major Murison he finds an energetic and worthy successor.

The year under report was in almost every respect a satisfactory one. The death rate fell from 26.85 per mille in 1922 to 23.54 per mille in 1923; the birth rate, at a figure of 28.82 per mille shewing only a slight improvement above that of 1922,—28.43 per mille. The net result, however, is that the natural increase of population rose from 1.58 to 5.28 per mille,—a striking advance. Statistics are still inaccurate, of course, and especially so for the Kamrup district, but the tests made by the vaccination staff during the year shew that even here there is definite improvement, and that the measures taken to check and control returns are beginning to tell. On the tea gardens figures are much more accurate, and a birth rate of 28.69 and a death rate of 21.97 per mille were here recorded; figures which are probably much more representative of the real figures for the province than those actually shewn. The tea gardens of Assam, in fact, shew a lower death rate than that recorded for any province in India, a fact which should dispel the myth that the tea garden labour forces are not properly cared for and looked after.

Infant mortality also fell from 198.20 per mille in 1922 to 179.50 per mille in 1923, a most satisfactory feature of the year. Hitherto the Red Cross Association has been somewhat dormant in its activities in Assam, but is now active. The staff of the kala-azar survey have been equipped with lanterns and slides and much publicity work and propaganda are in progress.

The mortality from all the principal diseases except small-pox shewed a decrease. The death rate from cholera fell from 2.36 to 0.54, and the year was free from any serious epidemic. In Nowgong, however, small-pox was sporadic throughout the year, and at times almost epidemic in its prevalence. The Civil Surgeon suggests that vaccination should be made compulsory in the rural areas of the district. At present compulsory vaccination is in force in urban areas and in certain selected rural areas, and the extension of the Act is under the consideration of Government.

"Fevers" of course head the mortality lists; with a general mortality rate of 15.52 per mille as against a figure of 16.05 for 1922. Goalpara and Kamrup shewing the highest figures,—15.18 and 17.38 respectively. As these districts are the home of kala-azar in Assam, this high figure must be ascribed chiefly, if not mainly, to epidemic kala-azar. The whole of the kala-azar organisation in the province has indeed been thoroughly overhauled during the year. The budget provision for preventive and treatment measures has risen to Rs. 2,85,000 per annum; and we are delighted to note that the proposed Commission to enquire into the mode of spread of the disease has now been established, under the able direction of Lieutenant-Colonel S. R. Christophers, C.I.E., D.S.O., I.M.S., and with a full staff and facilities under the auspices of the Indian Research Fund Association, with further financial assistance from the Assam Government. Here at last we have a real attempt to tackle this most difficult problem on lines of personnel and organisation comparable with those adopted by the Royal Society and the London and Liverpool Schools of Tropical Medicine in their sleeping sickness commissions. Similar methods can here hardly fail to produce similar results; our knowledge of the epidemiology of the disease is already very extensive; the clue to the discovery of the mode of transmission may not be very far to seek; and in another year or two we may have a discovery announced of importance only second to those

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of the modes of transmission of malaria and of yellow fever and sleeping sickness. Perhaps this is the most satisfactory feature of the whole report; the old time policy of "one research worker, one disease" has been given up, and men, material and facilities are concentrated at a time on one given problem with every prospect of success.

Apart from this special enquiry, however, the year saw an enormous extension of the provincial measures against the disease. The want of co-operation between the medical and public health organisations of the province has been met by the creation of a Public Health Committee of which the I. G. C. H. and Director of Health are both members, and civil surgeons have been made responsible for anti-kala-azar treatment in their districts, with instructions to tour for ten days a month with special reference to kala-azar in the endemic and epidemic areas. The number of sub-assistant-surgeons on special duty on the kala-azar survey was increased from 48 in 1922 to 79 in 1923; they treated 35,071 cases with 4,131 deaths in 1923 as against 19,659 cases with 2,292 cases deaths in 1922. In other words the department has been increased by some 70 per cent. in its activities and scope. The enormous number of cases treated in 1923 does not mean any increase in the prevalence of the disease; it is due to better diagnosis and the tracking down of cases. The death rate of the cases treated was remarkably low; only 11.7 per cent. as against a corresponding figure of 38.8 per cent. in 1920. One of the chief difficulties encountered was that patients are often unwilling to attend for the long course of injections necessary to cure, and compulsory powers have had to be used in some instances.

In Cachar 737 villages were surveyed and 117 of them were found to be infected. The whole district of Sylhet was surveyed and found to be much more heavily infected than was previously thought to be the case. In brief the more intensive the survey everywhere, the heavier the degree of infection found. It is clear that the hopes which were once entertained that wholesale treatment of cases might act as a prophylactic measure towards preventing the spread of the disease are doomed to disappointment, and until the transmission problem is solved, nothing can be done except to try and hold the scourge in check. Even in Lakhimpur, a district which was previously thought to be non-infected, 121 suspicious cases were reported during the year.

No extension of the anti-malarial campaign was possible, as funds were not available; but the previous operations at Pasighat and Haflong were continued. Under an additional and special grant from the Indian Tea Association, Dr. C. Strickland, Entomologist to the Calcutta School of Tropical Medicine, has commenced a preliminary malarial survey of the Assam tea gardens, and as this survey work continues and results become available, it is hoped that the gardens may be able to take measures to cope with the disease.

An appeal to the Rockefeller Foundation to initiate an anti-hookworm campaign in the province has so far not been successful. We trust that this decision is not final; the magnificent and world-wide work of the Foundation is well known and they could find nowhere a better opening than in Assam. The policy both of Heaven and of the Rockefeller Foundation is to help those who help themselves, and in its special anti-kala-azar campaign Assam has given a public-spirited lead to the whole of India. But the result is that there is no money to spare for other operations, for campaigns against malaria and hookworm. Further, a helminthological survey of Assam would be certain to yield results of very great interest; ethnologically the population of the province is a very mixed one, partly Aryan, partly Mongolian, partly indigenous and partly immigrant. Flukes of rare species are quite common in Assam, and it is quite likely that new and interesting species would be found. If the Rockefeller Foundation cannot undertake the task, we would enquire whether there is not some wealthy English or Indian merchant prince who has made his fortune in this country, to step into the breach?

The death rate from dysentery and diarrhœa, 1.33, was well below that for the decennium, 2.02. There was a remarkable fall in the sale of quinine, the number of treatment parcels sold having dropped from 10,603 in 1922 to 4,589 in 1923. Partly this is due to the increased price of quinine, partly to improved diagnosis in a large number of cases of kala-azar, chiefly however, to the general healthiness of the year. There were 29,058 immigrants to the province during the year, but only 6 admissions to the Goalundo immigrants' hospital.

Finally, Major Murison has set on foot a hygiene publicity campaign, and has approached the Red Cross Association for funds for lanterns and slides, vernacular literature and for propaganda work to be carried out in the villages by six of the kala-azar sub-assistant surgeons.

The whole of this interesting report records progress. The new kala-azar commission under the Indian Research Fund Association has now started operations in the province, and we look forward with some optimism to the results of its labours, and to discoveries which will enable the administration to exterminate the disease.

ANNUAL REPORT. CHEMICAL EXAMINER, MADRAS, 1923. BY MAJOR CLIVE NEWCOMB, M. D., A. I. C., I. M. S.

Major Clive Newcomb's reports are always of interest, and his report for 1923 is no exception to this rule. During his leave on six months absence to the United Kingdom 1923, Khan Sahib Muhammed Azizullah Sahib Bahadur acted for him.

The total number of the cases and articles examined was about the same as usual. The number of the stomach-washes examined for the Madras General Hospital was below normal, and with the appointment of a professor of bio-chemistry this section of the work expected to disappear. In the 204 cases of human poisoning examined, poison was detected in 92, or 45 per cent. The poisons most commonly encountered were mercury, arsenic, opium, aconite, oleander, strychnine and atropine in that order of frequency. Single cases of poisoning occurred with powdered glass, nitric acid, lysol, lead and kerosine oil, —the last being the case of a small girl, five years old, to whom 3 drachms of kerosine oil were administered by mistake for quinine mixture. Shortly after taking the oil she vomited, an hour later collapse set in, and the temperature, which had been normal, rose to 103.8° F. before death.

After studying the method used at the Home Office by Sir William Willcox for the detection and estimation of arsenic by the use of Marsh's electrolytic apparatus, the apparatus has been ordered for the department.

Dhatura poisoning accounted for 4 cases. It is very commonly employed in cases of robbery on passenger trains, the thief administering the drug in coffee or sweetmeats. In one case, a girl of 16, married to an elderly widower, after two attempts to get away from him administered dhatura to him and his son and brother. All three recovered, however.

Two cases occurred in which aconite was administered in sweetmeats or in a curry. The question was raised as to whether the tingling and numbness produced by the aconite would not be sufficient to stop the victim from going on eating the sweetmeats or curry, but Major Newcomb shews that it takes some ten minutes for the tingling to set in and half an hour before the full numbness develops.

One case reported is full of psychological interest. A man married a wife, who came to live with him a year after the onset of puberty. The father-in-law, a widower, tormented her with undesirable attentions, and domestic trouble ensued which lasted some years. Finally the young man, apparently desperate at his troubles, gave his wife a piece of *jaggery* to

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eat, poisoned with mercury. Symptoms of mercurial poisoning having set in, the local *dhobie* was called in, who combined his profession of washing clothes with the functions of a devil exorcist. The *dhobie* burnt incense before the girl, beat her on the head with a broom-stick, and tried to persuade her to hold burning embers in her hand. Finding all his efforts unsuccessful, he suggested that medical aid should be called in, and the patient finally recovered. Whilst still in a critical state, she made a dying declaration implicating the husband, who then tried to commit suicide. He was sentenced to two years rigorous imprisonment.

The practice of administering love philtres is doubtless, for the most part, an amiable weakness, but one not altogether free from risk, as is illustrated by a case where a man's mistress gave him one which contained mercury and which proved fatal.

A curious case of cobra bite is recorded. A certain snake charmer was going round the villages in the Villupuram *taluk*, advertising a cure for snake bite, and inviting any of his audience to be bitten by a cobra which he had with him under a promise to cure him immediately. In one village a man volunteered and was bitten and unfortunately died within half an hour in spite of all the snake charmer's remedies. The snake was forwarded and on examination proved to be a cobra with intact fangs and venom glands.

Cattle poisoning shows a steady decrease of recent years in the presidency. Yellow oleander, arsenic and mercury are the poisons most commonly employed.

During the year 1,655 articles were examined for stains with blood or semen or both from 380 cases, and 1,018 specimens of blood stains sent to the Imperial Serologist for determination of the character of the blood, which proved to be human in 924 cases. A much needed note on the interpretation of the reports on stain cases was drafted and circulated to judges, magistrates and the police for information. In one case a murderer left behind what at first sight appeared to be two prints of blood-stained hands on a whitewashed wall. The tests for blood were all negative, but the subject was further investigated by making blood stains on a whitewashed wall in a place where they were sheltered from direct sunlight and were examined at intervals for a period up to one year. Up to two months all tests for blood were positive. After a year the guiacum-turpentine test was still positive, and the micro-spectroscopic test after treatment with potassium cyanide and ammonium sulphide was also positive; the reduced hæmatin spectrum test however failed. It is clear that blood stains on a whitewashed wall can still be identified as such up to a period of a year. In one instance what appeared to be clotted stains on a ladder turned out to be merely due to paint.

Florence's test for seminal stains has given positive results with stains which have been kept for over a year loose in an envelope.

Nine bomb cases were investigated; in all of them the bombs were of percussion pattern. Two cases occurred during the year in which the problem of identifying a headless corpse came up, and in one of them it was proved that the finger-prints of the corpse corresponded with the prints that the man who had disappeared had affixed to a document some time before. Investigations were also carried out as to how much can be inferred from the clothes of the victim as to the nature of the weapon used and the range in shooting cases, and have already been recorded in this journal.

688 articles were sent for general analysis, of which 343 came from the Customs. For the estimation of silver a nephelometric method was tried but abandoned in favour of the older gravimetric one, as the presence of copper seemed to spoil the accuracy of the former. A most useful bit of work undertaken was the periodic testing of samples of drugs which are liable to decompose, kept for some time in the General Hospital. One bottle of paraldehyde which had been for some years in the dispensary, was found to have been almost entirely converted into acetic acid. Samples of carbon tetrachloride tested all proved to be free from carbon bisulphide. A standard for the change of density per degree centrigrade of ground-nut oil between the temperatures of 10 and 35° C., was found to be 0.000615—0.000060.

Amongst the general analyses asked for was the examination of a lump of metal dug up in a village and alleged to be gold. On filing the appearance was like that of gold, but analysis proved the metal to be merely brass.

Correspondence.

GANGOSA IN INDIA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I was very much interested in Mr. Holland's description of a case of gangosa treated by him in the C. M. S. Hospital, Quetta. Some fifteen or sixteen years ago I saw and treated a case in Malwa, Central India. Unfortunately my notes on the case have been lost, but it made such a vivid impression on me that I can describe it from memory.

My patient was a young Hindu woman of the cultivating class who had never been away from her village.

There was no history of syphilis and the beginning and progress of the condition was very similar to that described by Mr. Holland.

I cannot remember the period which had elapsed since the first onset until I saw her, but think it was about two years.

She presented a ghastly and distressing appearance. The whole lower part of her face was covered with light coloured scar tissue, rather elastic. Both alæ of the nose were affected and both nostrils were completely occluded. There was a small circular opening, just large enough to admit a goose quill in what had been the centre of the mouth, but no sign of the lips. Each time the wretched woman drew in her breath the cheeks were sucked in and on expiration they were blown out. Her husband fed her by passing in grains of rice and small pills of bread; fluid was passed in with difficulty as it was often blown out again.

An incision was made across where the opening of the mouth should have been, the mucous membrane brought out without much difficulty and two fairly satisfactory lips were re-formed. The nose was more difficult to deal with, but by keeping pieces of drainage tubing in the nostrils they eventually remained open.

The result was quite satisfactory for two or three years, but since then I have not heard of the woman.

This is the only case of this disease which I have seen or heard of in India until the one now reported from Quetta.—Yours, etc.,

J. R. J. TYRRELL, *Lt.-Col. I.M.S.,*
Agency Surgeon in Bundelkhand.

NOWGONG, C. I.
2nd September, 1924.

A CASE FOR DIAGNOSIS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—A Hindu boy aged 15 had been suffering from the anæsthetic form of leprosy for 4 or 5 years. He came under my treatment in the last week of September 1921. After satisfying myself that the diagnosis was correct, I put him on to sodium hydnocarpate intravenously and tablets of the same drug by the mouth.

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I gave the intravenous injections twice a week, when owing to some domestic inconvenience, the patient could not continue to receive injections, but continued to take the tablets regularly. He again came to me for intravenous injections in the last week of December 1921. The injections were again resumed. In January 1922, I increased the dose and gave two injections of the increased dose, (1½ ampoules of sodium hydnocarpate of strength 1 gr. in 2 c.c. in each ampoule). The patient did not show any reaction to this. But whilst the third injection was being given at the usual interval, the patient complained of intense burning pain in the eyes. No sooner was the needle of the syringe withdrawn from inside the vein, than the patient began to complain of intense burning pain in the stomach and dimness of vision. The conjunctivæ became congested. Then almost in a minute spasmodic convulsions of both the extremities began with lock-jaw, saliva flowing from the corners of the mouth with a cold clammy sweat all over the body and with a very feeble and almost imperceptible pulse. The corneal reflexes were lost, the respirations stopped and there was involuntary passage of urine and fæces on to the table.

This condition continued for 4 minutes when all the symptoms subsided, but unconsciousness, feeble pulse and cold and profuse sweating lasted for half an hour more, after which he began to slowly recover. In the meantime the necessary and approximate treatment was carried out and the patient recovered; but the redness of the eyes continued for three days afterwards.

Afterwards it struck me that this might have been an epileptic fit, as it showed all the symptoms and signs of this. I enquired whether the boy had ever had any such attacks previously and whether there was any epilepsy in the family, but the reply was in the negative. Another point of interest was that the boy did not get any more of these fits afterwards, and though it is now nearly 2½ years after the first fit he never got any second attack. I wonder what was the reason for these symptoms, especially as he was accustomed to receiving such injections previously without the least signs of any distress and anxiety.—Yours, etc.,

Y. S. ROW, L.M.P.

BELLARY,

8th August, 1924.

[*Note.*—We have shewn the above letter to Dr. E. Muir, Leprosy Research Worker, Calcutta School of Tropical Medicine, who comments upon it as follows:—"It looks as if the injection had precipitated an epileptoid fit. I have seen such fits come on after or during the rigor of malaria. I do not think that the drug is likely to have had any special action in this way. However, I myself have now given up its use intravenously some time ago, in favour of the method of treatment by subcutaneous infiltration with the esters."—EDITOR, *I.M.G.*]

LOCAL TETANUS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Some time back I saw a case of local tetanus quoted in your columns and the reporter enquired if any one had had a similar experience. I beg to refer him to page 509 of the "Diagnosis of Nervous Diseases" by Purves Stewart (1920 edition) where he will find the following passage:—

"In cases which have had a protective injection of tetanus antitoxin administered shortly after the occurrence of a wound, the clinical course of the disease is profoundly modified. In a large proportion of these cases no tetanus symptoms whatever supervene. In others a partial immunity is produced by the antitoxin, so that the bulbar centres are protected and generalised tetanic spasms remain absent, but we may have a modified post-serum or local tetanus." (The original cases were quoted in the *Lancet* of January 27th, 1917, p. 139.)

Such cases however must be very rare in civil life.—Yours, etc.,

MOHAMMAD YUSUF, M.D.

GUJRANWALA,

12th August, 1924.

MORPHIA TOLERANCE.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In your August 1924 number a correspondent, in citing a case of extreme morphia tolerance, confesses to having given this case 20 grains of morphia hypodermically. Can you tell me what the position for him would have been, had the patient developed morphia poisoning and died? Is a medical practitioner justified in taking such risks?

As an offset to his case of extreme morphia intolerance I would cite one of a similar nature; except that the drug concerned was chloroform. I have seen a Sikh given as much as 19 ozs. of chloroform to produce anæsthesia, but at the end of it, he was entirely unmoved; needless to add the individual was addicted to large quantities of opium and a bolus of it, as large as a marble, did not make him turn a hair.—Yours, etc.,

B. J. BOUCHE.
Assistant Surgeon, I.M.D.

JUTOGH-SIMLA,

The 13th August, 1924.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—With reference to the correspondence on morphia tolerance in your issue for August 1924 I would suggest the following line of treatment.

(1) Hyoscyamine hydrobromidum—gr. 1|64 morning and evening at the expected times of taking morphia.

(2) ℞

Tint. digitalis	.. ..	m x
Tinct. belladonnæ	.. ..	m v
Extracti xanthoscylin liq.	..	m v
Tinct. hyoscyami	.. ..	m xx
Aquam ad	.. ..	oz. i.

Ft. Mist. Sig. one oz. t.d.s.

(3) ℞

Sodii bromidi	.. ..	gr. xx
Chloral hydrati	.. ..	gr. xx
Aquam ad	.. ..	oz. i.

Ft. Mist. Sig. one oz. before going to bed at night.

(To prevent insomnia)

(4) Camphor monobromide may be administered in pill form if it is considered necessary to prevent the craving for morphia. The morphia or opium may be brought to nil within 4 or 5 days gradually with the above treatment, and then the treatment should be continued for another ten days or so. After that the treatment can be left off gradually by decreasing the doses of medicine and stopped entirely within some two weeks. A patient taking half a *tola* of opium daily became cured within two weeks under this treatment.—Yours, etc.,

WATTAN SINGH, L.M.P.

44TH GENERAL HOSPITAL
LANDIKOTAL (N.W.F.P.)
Via PESHAWAR.

23rd August, 1924.

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WHY ARE WE RIGHT HANDED.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Dr. Jaensch in your August 1924 number talks of the possibility of a bi-symmetrical development in man. Education has nothing to do with one-handedness for according to himself uncivilized man tends to the same practice. The wild aborigines in the Andaman Islands use their right hands for the actual discharge of the arrow from the bow. It is the same with semi-civilized races on the N. W. Frontier, in Somaliland, and elsewhere that I have observed.

Let Dr. Jaensch more carefully observe an infant and he will see its pronounced tendency to use the right hand more than the left.

At football, a beginner invariably uses his right leg and usually uses it, even when an expert, with greater facility and effect than the left. In swimming, the same stress on the right arm is used. There is no question of education here, it is a natural act pure and simple. The cases you quote in a note to Dr. Jaensch's letter are not true cases of ambidextrousness except the last. The late Colonel R. Bird, I.M.S., Professor at the Calcutta Medical College could equally use both hands simultaneously on a blackboard, not only in writing but in drawing diagrams, but his was a case of cultivation, and he was known to admit that it was not a natural gift or power. So, if it is a result or product of sheer cultivation, I think logically, the idea of a centre for symmetrical development cannot be supported.—Yours, etc.,

B. J. BOUCHE,
Asst. Surgeon.

JUTOGH-SIMLA,
13th August, 1924.

[*Note.*—We hope to publish an interesting lecture on this subject by Dr. Prakash Chandra Das, Medical Officer, Ranchi European Mental Hospital, in our columns, as soon as the pressure on our available space permits.—EDITOR, *I.M.G.*]

A SEVERE CASE OF SYPHILIS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In January, 1924, an adult male Hindu patient came to see me with a history of syphilis of six months' duration. He had severe secondary eruptions all over the body, but under Ayurvedic treatment these had subsided within a month. Some time afterwards condylomata appeared, in the umbilicus, the rectum, between the penis and scrotum, between the fingers and toes, near the lobes of both ears, and at the angles of the mouth. The other systems of the body were not affected, except that he suffered from severe headaches and profound debility. I treated him with a mixture of hydrarg. perchloride and potassium iodide, with calomel dusting powder locally for the sores. A week later injections of novarsenobillon were commenced, but after the second injection he developed a large gumma in the left side of the neck in the submaxillary region. This was opened and healed rapidly. After a third injection of novarsenobillon he recovered rapidly, all the condylomata clearing up. In the course of my service I have seen many cases of syphilis, but never so severe a case as this.—Yours, etc.,

RAM PERSHAD, L.M.P.

CHAKMEHSI DISPENSARY,
RANITOLA P. O., DARBHANGA.
18th August, 1924.

[*Note.*—Any one who had any experience of syphilis in India in the pre-salvarsan days will be able to recall many such very severe cases. The Cantonment and Followers' Hospitals of India used to be full of them prior to 1908, and many proved fatal. There are several curious features about syphilis in Indian patients; the frequent severity of the secondary and tertiary lesions; the curious infrequency of tabes and of central nervous system involvement; the occurrence quite frequently of primary *acquired* chancres near the anus in young children and of extra-genital chancres in adults; the occurrence of severe cases of mercurial poisoning in patients treated with heroic local and general doses of mercurials at the hands of practitioners of the indigenous systems; the use of poultices of leaves, with severe secondary septic infection of gummata, etc.—EDITOR, *I.M.G.*]

AN EPIDEMIC DISEASE IN BOMBAY.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—A large number of cases showing the following train of symptoms have been noticed lately in all parts of Bombay city:—

The attack commences with acute coryza, a large amount of clear watery secretion coming away, very often from one nostril only, and this coryza disappears almost as suddenly as it came in about two days, leaving behind no other symptom of cold except a slight congestion of the nasal mucous membrane. There is hardly any rise of temperature in most cases, a few varying between 99° to 100° F. at most.

There is pronounced lassitude without marked headache or any congestion of the eyes, but some patients complain of aching of the whole body musculature; none of the joints are involved. The disinclination to work or exertion of any kind almost amounts to prostration, and this lasts for some days beyond the acute duration of the disease which may be taken as 3 to 4 days in the majority of cases. Distaste for food is very marked for some time after the onset, many people complaining of nausea at the sight of food.

There is slight congestion and soreness of the throat, though not in all cases. The most peculiar feature of this malady—if it is at all a new malady—is the involvement of the 5th cranial nerve on one side only. There is a peculiar sensitiveness of the upper part of the face and scalp on the affected side, a light touch in the area causing wincing and an exquisitely tender sensation, whilst firm pressure gives rise to dull pain. Most people are unable to lie on the affected side owing to this queer tenderness and the commonest disability on this score that many complain of is that they cannot brush their hair on the affected part of the scalp without great discomfort.

This sign lasts from two to six days, being at its highest on the third day of onset, and then slowly disappearing.

Tenderness of the external ear and pain in all the teeth on one side often accompany the peculiar sensitiveness of the face and scalp.

Is this merely another manifestation of the protean influenza germ? The constancy with which the fifth nerve is singled out for attention is quite remarkable, and it is nothing like what we have seen in repeated waves of influenza epidemics.

It would be interesting to know if similar cases have been noticed in other centres in India.—Yours, etc.,

E. E. MADON, L.M. & S.

241, PRINCESS STREET,
BOMBAY, *4th August,* 1924.

[*Note.*—Probably a bacterial infection of the upper respiratory passages. The terms "influenza" or "febrile catarrh" are applied to such conditions to mask our ignorance of their real nature.—EDITOR, *I.M.G.*]

THE USE OF EMETINE INTRAVENOUSLY.

To the Editor, THE INDIAN MEDICAL GAZETTE.

DEAR SIR,—May I be permitted to endorse the views stated by Assistant Surgeon Vasavada in your issue for September? I have for the last three years always given emetine in this way and frequently allowed the patient to go away immediately.

I have never seen any ill effects following an injection, but rarely give more than half a grain for a dose.

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In very acute cases of dysentery I give 1|12th gr. of morphia with the intravenous injection and it acts like a charm.

I have also had a case of threatened liver abscess which I believe was aborted by 1 grain doses twice daily.

The freedom from pain after intravenous injections is a great asset.—Yours, etc.,

F. J. W. PORTER,
Major,
D.S.O., R.A.M.C. (retd.)

BOMBAY,
18th September, 1924.

Service Notes.

APPOINTMENTS AND TRANSFERS.

Lieutenant-Colonel F. W. Sumner, M.D., F.R.C.S.E., I.M.S., Civil Surgeon, Simla East, is appointed to hold charge of the duties of the Civil Surgeon, Simla West, in addition to his own, during the absence on leave of Lieutenant-Colonel W. W. Jeudwine, C.M.G., I.M.S.

Lieutenant-Colonel A. Fenton, M.B., I.M.S., Civil Surgeon, Mandalay, is appointed to officiate as Inspector-General of Civil Hospitals, Burma, *vice* Colonel P. Dee, granted leave preparatory to retirement.

Lieutenant-Colonel J. W. Watson, C.I.E., I.M.S., an Agency Surgeon, on return from leave, is posted as Civil Surgeon, Ajmer, and Chief Medical Officer in Rajputana, with effect from the 18th August 1924.

Major A. N. Dickson, I.M.S., an Agency Surgeon, on return from leave, is posted as Medical Officer, Sistan Consulate, with effect from the 1st September 1924.

The services of Major C. J. Stocker, M.C., M.D., I.M.S., Superintendent, Peshawar Jail, are replaced at the disposal of the Government of India in the Foreign and Political Department, with effect from the 1st September 1924 or the subsequent date on which he may revert as an Officiating Agency Surgeon, under that department.

Major H. H. King, M.B., I.M.S., Officiating Assistant Director, Central Research Institute, Kasauli, is appointed temporarily to act as Director, Pasteur Institute, Kasauli, in addition to his own duties, with effect from the date on which he takes over charge from Major Stevenson.

The services of Captain M. G. Bhandari, I.M.S., are placed temporarily at the disposal of the Government of Bombay for employment in the Jail Department, with effect from the date on which he assumes charge of his duties.

Captain R. Kharegat, I.M.S., is appointed to officiate as an Agency Surgeon, and is posted as Civil Surgeon, Ajmer, and Superintendent, Central Jail, Ajmer, with effect from the 25th July 1924 and until further orders.

Lieutenant J. N. Madan, I.M.S. (T. C.), Officer Commanding, Indian Station Hospital, Bandar Abbas, is appointed to Officiate as Agency Surgeon, Maskat, in addition to his own duties, with effect from the 7th July 1924.

LEAVE.

Colonel P. Dee, K.H.S., I.M.S., Inspector-General of Civil Hospitals, Burma, is granted 8 months leave, with effect from the 1st October 1924.

Lieutenant-Colonel E. C. Hodgson, D.S.O., I.M.S., an Officer of the Medical Research Department, is granted leave on average pay for eight months combined with leave on half average pay for four months, with effect from the forenoon of the 8th March 1924.

Lieutenant-Colonel W. W. Jeudwine, C.M.G., I.M.S., Civil Surgeon, Simla West, is granted leave on average pay for 2 months and 21 days combined with study leave for 2 months and 28 days, with effect from the 10th October 1924 or such subsequent date as he may avail himself of it.

Major W. L. Harnett, I.M.S., Superintendent, Campbell Medical School and Hospital, Calcutta, is allowed leave, with effect from the 15th September 1924.

Major W. D. H. Stevenson, C.I.E., M.D., I.M.S., Director, Pasteur Institute of India, Kasauli, is granted leave on average pay for 6 months and 12 days combined with leave on half average pay for five months and 18 days, with effect from the 3rd October 1924 or date of availing.

PROMOTIONS.

Colonel to be Major-General.

Harold John Kinahan Bamfield, D.S.O., K.H.P., *vice* Major-General James Jackson, C.I.E., M.B., retired with effect from the 23rd September 1924, Major-General Bamfield's tenure of appointment will reckon from this date.

To be acting Lieutenant-Colonels.

Major (now Lieutenant-Colonel) W. D. A. Keys, C.I.E., M.D., I.M.S., to be acting Lieutenant-Colonel from 21st July 1916 to 27th December 1919, whilst commanding a Field Ambulance in Mesopotamia.

Major (now Lieutenant-Colonel) G. H. Stewart, O.B.E., M.B., I.M.S., to be acting Lieutenant-Colonel whilst commanding No. 165, Indian Field Ambulance, from 3rd September 1917 to 26th January 1919.

Major (now Lieutenant-Colonel) C. E. Bulteel, C.B.E., I.M.S., to be acting Lieutenant-Colonel whilst commanding the Indian General Hospital, Kohat, from 8th June 1919 to 27th October 1919.

Captains to be Majors.

R. N. M. Porter, M.C., M.B., F.R.C.S.E., I.M.S., J. R. D. Webb, C.B.E., I.M.S., A. C. Macrae, M.B. —Dated 25th July 1924.

Captain (now Major) H. J. M. Cursetjee, D.S.O., M.B., I.M.S., to be acting Major from 19th November 1918 to 14th March 1921, whilst serving with a Combined Field Ambulance in Mesopotamia.

Lieutenants to be Captains.

Frederick Hamilton Whyte. Dated 16th April 1924.

A. L. Watts, M.B., I.M.S. Dated 12th November 1923.

MISCELLANEOUS.

On return from leave Major P. F. Gow, D.S.O., M.B., I.M.S., was on general duty at the Medical College Hospitals, Calcutta, from the 27th July to the 13th August 1924, both days inclusive.

Captain (now Major) L. A. P. Anderson, I.M.S., relinquished the temporary rank of Major on ceasing to be employed as a Deputy Assistant Director, Medical Services, dated 28th February 1922.

NOTES.

CALCUTTA SCHOOL OF TROPICAL MEDICINE, SHORT TERM CERTIFICATE EXAMINATION RESULTS. SEPTEMBER, 1924.

THE following passed the examination for the certificate granted by the Bengal Faculty of Tropical Medicine at the Calcutta School of Tropical Medicine, September, 1924:—

Balwant Krishnaji Aloni.
Gagan Chandra Chatterji.
G. A. Dalvi.
Sachindra Kumar Das.
Pranhari Das Gupta.
Sudhansu Bhusan Dutta.
S. N. Eate.
Govind Ram.
Phani Bhusan Ghosh.
Sailendra Nath Ghosh.
Balkishen Gussain.
Mukund Shesrao Kolwadkar.
John Lowe.
Christie McGuire.
Ashutosh Paul.

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The good effects of Bovril are almost instantaneous, and the Medical Practitioner frequently decides to administer Bovril in cases of exhaustion or threatened collapse.

Bovril is a food as well as a stimulant. When taken regularly over measured periods, Bovril has been found to possess body-building powers of a very special and remarkable character.

Bovril

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INTESTINAL STASIS

Malnutrition of long standing, toxic origin, especially in cachexia, tuberculosis, malaria, etc. Hepato-biliary insufficiency and sluggishness, resulting in intestinal stasis and toxemia.

TABS.

HEPATO-SPLENIC CO.

(Harrower)

INTESTINAL INDIGESTION

Functional liver insufficiency, intestinal stasis, sluggish bile flow, duodenal indigestion, mucous colitis. Chronic hepatic disease, with cirrhosis or hypertrophy.

TABS.

BILE SALTS CO.

(Harrower)

INTESTINAL TOXEMIA

Chronic indigestion with toxemia, stasis, constipation and results thereof. Hepato-alimentary insufficiency, with fetid, clay-like stools. Pancreatic insufficiency. Hypochlorhydria.

TABS.

SECRETIN CO.

(Harrower)

Write for complete details to

THE ENDOCRINE LABORATORY

SIMLA

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BISMUTH PREPARATIONS IN SYPHILIS.

A STUDY of present day medical literature shews that, following upon the original investigations of Levaditi and Sazerac, bismuth compounds are now being used more and more in the treatment of syphilis, frambœsia, and other spirochætal diseases. Although not as powerful as the salvarsan derivatives, they seem preferable to the secondary administration of mercury, and seem to be coming to replace it. In this connection we have received from Messrs. L. H. Goris, 49, Queen Victoria Street, London, E. C. 4., two very elegant bismuth preparations prepared by the Produits Chimiques et Pharmaceutiques Meurice of Belgium. The first is "Bismuthyl," which is stated to be precipitated bismuth (97 per cent. of pure metal), in an isotonic glucose medium, for intramuscular use. The injection of 2 c. c. appears to be quite painless, and the course of treatment advocated is one 2 c. c. ampoule daily until 2½ to 3 grains have been injected; then one month's interval; then a second course, followed after another month's interval by a third. The drug is put up in courses, each of 12 ampoules, and clinical reports speak well of results with it.

A second preparation is "Bi-Quinyl," a double iodide of quinine and bismuth, containing 50 per cent. of bismuth. For this compound it is claimed that it combines a high therapeutic activity with an absolute freedom from toxic effects or pains, indeed that it is so painless on injection that it can be given subcutaneously in place of intramuscularly. It is therefore very suitable for the treatment of private patients who object to the pain of intramuscular injections, and especially for the treatment of congenital syphilis in children. The ampoules each contain ·3 c. c., and a course of one injection every three days until 15 or 20 injections have been given, followed by an interval and then a second course, are advised.

A third preparation of the same firm is "Injectable Urenile," hexamethylene tetramine, for intramuscular injection. This is claimed to be urotropine of special purity suitable for intramuscular injection. Its therapeutic indications consequently cover a wide field, and its use is recommended in gonorrhœa, especially in gonorrhœal cystitis, in all forms of local sepsis and in encephalitis lethargica, in influenza, pneumonia and bronchopneumonia, in septicæmic states generally and in diabetic acidosis. Messrs. L. H. Goris will be pleased to send samples and literature upon application.

MESSRS. BOERHRINGER'S PREPARATIONS.

OF several interesting preparations by this firm, "Diplosal" is perhaps the most valuable. It is the salicylic ether of salicylic acid, and being insoluble in water and in dilute acids, when administered orally it passes unchanged through the stomach, to become split up in the intestine. On absorption of water 100 parts of Diplosal are stated to liberate 107 parts of salicylic acid. Clinically the drug is of value as an anti-rheumatic and antipyretic; and its use has been recommended in cases of articular and muscular rheumatism, neuralgia, sciatica, migraine, influenza, pleurisy, cystitis—whether gonorrhœal or not—and urethritis.

A second preparation by the same firm is "Arsenoferratose," a derivative of cacodyl containing 0.3 per cent. iron and 0.003 per cent. of arsenic. The drug is one which is easily tolerated when taken orally, and of use in all conditions of anæmia where iron and arsenic therapy is indicated. The Indian agents of the firm are Messrs. C. Gresham & Co., 17, Ezra Mansions, P. O. Box 492, Calcutta.

VIROL, LTD.

PRESIDING at the annual meeting of Virol, Ltd., Mr. B. S. Straus, J. P. (the Chairman), said that the sales during the period under review constituted a new record in the history of the company's trading. This evidence of further development of their continually growing business was in itself very pleasing, but still more gratifying was the fact that this expansion was undoubtedly due to the remarkable manner in which recent food investigations had confirmed the importance in their relation to health of certain principles of food which were the essential factors of Virol.

They now knew that growth and development as well as resistance to disease were dependent not on vitamins alone, but on the presence of vitamins in a diet in which the various food constituents bore correct relation one to another. These fresh investigations had demonstrated the importance of the interaction of the various food elements, and had shown that even foods containing vitamins failed to produce satisfactory growth unless other food constituents were present in proper proportion. Virol fulfilled these essential conditions, for in addition to its physiological balance, there was indisputable scientific evidence of its vitamin value. Moreover, Virol met the needs of malnutrition in a very special manner, for its great nutritive properties were presented in a form readily available for the reconstruction of wasted tissues. This explanation of the continued growth of their business was confirmed by the clinical experience of more than 3,000 hospitals and public health authorities in which its use had so increased that last year the quantity supplied to these institutions was equivalent to 40 million prescribed portions of Virol.

Their other preparation, Virolax, which was being increasingly recommended by medical men as a laxative food especially suitable for children, was being increasingly prescribed as an ideal method of combating the constipating effects of sterilised milks in infant dietary.

During the past year the company had successfully introduced another preparation, Virol and milk in powder form. The peculiar suitability of Virol for athletes during training, and for those under long continued strain of feats of endurance was generally recognised. Scott, Shackleton, and other noted explorers attached great importance to its concentrated nourishment and took large supplies of Virol in their great adventures. Virol also formed part of the food equipment of the recent expedition to Mount Everest.

THE HARROWER ENDOCRINE CLINIC.

AN interesting departure by Messrs. Endocrines, Ltd., is described in their *Organotherapeutic Review* for July 1924. This is the establishment at Glendale, California, in connection with the Harrower Endocrine Laboratories, of a new special clinic devoted entirely to the study of the endocrine aspects of medicine from a clinical point of view, at a cost of £10,000. The building "will be most thoroughly equipped and no expense is being spared to provide the medical staff with every aid and facility that the most modern installation can include." Treatment is to be provided free of cost to indigent patients, and the institution is under Dr. H. A. Hall. It is hoped "that the volume of carefully controlled clinical information that this institution will be able to supply will be of the utmost assistance in continuing and broadening our knowledge of endocrine therapeutics, and in providing statistics and data that will lead to further developments."

Our knowledge of endocrine therapy is to-day but rudimentary, and—if quackery is to be avoided—every new departure in this most modern field of therapy must be most carefully and fully investigated, both from the experimental physiological and biochemical and from the medical and clinical points of view, before it can be accepted for general use. Hence the establishment of such a new laboratory as this should be of immense usefulness in putting endocrine therapy upon a rational basis. We trust that investigation of endocrine conditions in connection with the great diseases of the tropics will not be overlooked, for such investigation is very badly needed.

Full information can be obtained from the Simla branch of Messrs. Endocrines, Ltd.

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MESSRS. C. BAKER'S LIST OF SECOND HAND INSTRUMENTS.

It is always a pleasure to glance through the list of second hand scientific instruments stocked by Messrs. C. Baker, 244, High Holborn, London, W.C.1, since the firm is one with a deservedly high reputation and their instruments can be relied upon. In their most recent list, the photographic section has been omitted, as it is now printed separately and includes 12 extra pages of the latest and best models introduced by the makers since the issue of the previous catalogue.

To the medical man the most interesting sections of this almost unique catalogue are those dealing with microscopes and accessories, spectroscopes, projection apparatus and physical apparatus. The list is well worthy of study by the general practitioner, the university teacher, the laboratory worker, the entomologist, and the general scientific worker.

The firm will be glad to supply their catalogues upon application.

SECOND HAND X-RAY AND ELECTRO-MEDICAL APPARATUS.

We have recently received from Messrs. Watson and Sons, Ltd., Sunic House, 43, Parker Street, London, W.C.2 an interesting list of their second hand *x*-ray and electro-medical apparatus,—their bulletin No. 61,—which will interest radiologists and hospital superintendents throughout India. The list includes details of available complete *x*-ray outfits, motor generator sets, induction coils, Coolidge filament transformers, mercury interrupters, switch-panels, screening stands, couches and tube stands, stereoscopes, viewing boxes, intensifying and fluorescent screens, exposure cases, *x*-ray tubes, diathermy and high frequency apparatus, apparatus for faradism, galvanism, cautery, etc., vibrators and light baths, medical batteries and coils, etc. It will be seen, therefore, that the list is very comprehensive and of considerable interest. All the appliances listed have been re-conditioned by the firm itself, and in view of Messrs. Watson and Sons' established reputation and high class workmanship, can be relied upon.

THE ROGERS VIOLET RAY HIGH FREQUENCY GENERATORS.

We have received from the Rogers Electric Sales Co., 180, Gray's Inn Road, Holborn, London, W.C.1, an interesting little brochure dealing with their different types of violet ray sets. The use of violet rays has now stood the test of a quarter of a century and their range of applicability is a very wide one. The sets of apparatus listed vary from the type J Vitalator at £4-12-6 with one general surface electrode, or £5-5-0 with three electrodes, and suitable for recommending to patients for personal use, to the *de luxe* type O model, suitable for professional use, with high frequency, cautery and ozone apparatus at £17-17-0. The latter is an attractive model; its weight is only 7½ lbs. and the finish very good. In addition to general models of generators, a series of special pattern electrodes for dental, surgical and special purposes is also given. The prices of the types of generators shewn are very moderate, whilst the firm's guarantee is placed on every instrument which they manufacture.

INSULINE BYLA.

We have received from the Anglo-French Drug Co. (Eastern), Ltd., Calcutta, samples of "Insuline Byla" prepared by Les Establissments Byla of Paris. It is put up in powder form in sterile glass ampoules containing 15 units in each. Dr. J. P. Bose, M.B., F.C.S. (Lond.), Diabetes Research Worker of the Calcutta School of Tropical Medicine, tested the samples by rabbit tests and found them to be of the prescribed strength. He suggests that the ampoules might conveniently contain 10 units instead of 15, so that in using smaller doses there would not be much loss of insulin.

SANITARY AND SCIENTIFIC EXHIBITION.

The All-India Maternity, Child Welfare, Sanitary, Scientific and Indigenous Drugs' Exhibition of the All-India Medical Licentiates Asociation will be held at Agra in December 1924. For particulars, please write to Dr. Shyama Shanker Shukla, Secretary, Exhibition Committee, Bailanganj, Agra, and for information regarding Indigenous Drugs write to Dr. Kunj Behari Lal Verma, Editor, *Indian Medical Journal*, Meerut.

PESTERINE.

Pesterine is prepared from crude fuel oil and consists therefore of a mixture of hydrocarbon oils and bases. These substances, though not strongly germicidal, are powerful insecticides and are therefore of peculiar value in plague epidemics. Plague fleas, along with the plague bacilli contained in them, are destroyed quickly and effectively. Ordinary "phenyle" contains in addition to tar acids (phenols and cresols) a certain proportion of neutral hydrocarbon oils somewhat similar to those in liquid fuel oil, but they are not nearly so insecticidal. The ordinary coal-tar disinfectants are therefore not very efficient insecticides, though they are often used under the impression that they are. In fact we may say that the higher the Rideal-Walker co-efficient, the less is the insecticidal power likely to be, a fact which is not often appreciated by municipalities and others when choosing disinfectants. Pesterine was introduced into India through the observations of the Health Officer of Bombay during the plague epidemic there in 1906. He had observed the success of *l'huile de Schiste* in France in killing flies and their larvæ.

The report of the Health Officer of Bombay for 1906 gives an account of experiments with pesterine and its use in plague epidemic. A room after being disinfected with pesterine will contain no fleas.

Pesterine is also of use in anti-malarial work; collections of water treated will remain free for a time from mosquito larvæ.

Pesterine is also of considerable use in camps in keeping latrines free of flies, where the ordinary phenyle proves valueless.

Publishers' Notice.

Scientific Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles will receive 25 reprints of the literary pages of the "*Gazette*" *gratis*, if asked for at the time of submitting their manuscripts.

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Original Articles.

ON A HERPETOMONAS FOUND IN THE GUT OF THE SANDFLY, *PHLEBOTOMUS ARGENTIPES*, FED ON KALA-AZAR PATIENTS.

A PRELIMINARY NOTE.

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Introduction.—Before giving an account of the experiments which form the essential subject matter of this paper, it seems desirable to give a brief résumé of the events leading up to them.

At an informal discussion between Majors H. W. Acton and R. Knowles and Dr. Napier in 1922 it was resolved that the difficult and important problem of kala-azar transmission should be the first to be investigated by the various workers at the School who were in a position to undertake this work. It was shewn by Acton and Knowles (1914) in their studies of the Halteridium parasite of the pigeon that the degree of infection varied very much with the time and season of the year, and in connection with kala-azar the first point upon which information was needed was to ascertain if possible at what time of the year new infections occur in man. It seemed likely that the following information would be of assistance:—(1) a frequency distribution table shewing the date of commencement of the fever, as recorded from the patients' own statements; and (2) an examination of the wet bulb thermometer readings during the year. In this way it could be seen whether there was any correlation between any peak in periods of greatest incidence of the disease and the wet bulb temperature record. Any such correlation might indicate the most favourable time of the year during which to carry out investigations; otherwise a great deal of useless work might be carried out at seasons when the temperature and humidity conditions were unfavourable for transmission.

At the same time Lt.-Colonel T. C. McCombie Young, I.M.S., then Director of Public Health, Assam, was approached, and the suggestion made that he should carry out a similar investigation in the far wider field of that province. The results of his enquiry were published in 1923, and shewed that in the most heavily infected areas the greatest number of new cases appeared to occur during the cold weather, and that probably the season most favourable for infection was the few months prior to the onset of the cold weather.

Lastly, Napier's aldehyde test does not become positive until about the fourth month of the disease:—a fact which is of still further assistance in determining roughly for any given case the approximate date of infection. During the period November to April many early cases come for treatment, whose aldehyde reaction is still negative. During the rest of the year negative reactions in kala azar cases are rare.

From a study of these issues, the conclusion was reached that the three or four months before November appear to be those when new infections are most likely to occur in Calcutta city, and would be the most favourable period for the proposed enquiry.

In 1923 at a second meeting between the same workers, Napier pointed out that there appeared to be a difference in the incidence of kala-azar among permanent residents of Calcutta city between the northern and southern parts of the city. An analysis of all such cases among permanent residents who had come under treatment in Napier's clinic was carried out by him, and the results published in 1923—(Knowles, Napier and Das Gupta 1923, p. 334). It was there shewn that there exists in Calcutta city an endemic focus of kala-azar in and around ward 14, where the infection is spreading among the local residents, "area B": whereas in northern Calcutta, "area A", although cases of kala-azar are very frequently imported in the form of patients who come into the city in considerable numbers from outside for treatment at the large hospitals, yet the disease here fails to spread, or to establish itself.

This finding made obvious the need for a very careful, full and detailed survey of area B, and of area A simultaneously as a non-endemic control. This survey has now been carried out in detail by the second author, (L.E.N.), and its results will shortly be published in a separate memoir.

In the meantime every effort was made by Napier to obtain the services of a trained entomologist for this particular research, but he was absolutely unsuccessful in all his attempts to obtain such help, and the most favourable period of the year in 1923 passed by without any further enquiry being possible.

In 1924 Major H. W. Acton, I.M.S.—then acting Director of the School—approached the Indian Research Fund Association, and through the kindness of Lt.-Colonel J. D. Graham, C.I.E., I.M.S., Secretary to its Scientific Advisory Board and the Governing Body, a grant was

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made, and the third author (R.O.A.S.) was deputed for special duty at Calcutta on this enquiry. In what follows, it may be remarked that the experimental work to be recorded was entirely carried out by the third author (R.O.A.S.), the first two authors only directing and supervising. We are also indebted to Temporary Assistant Surgeon B. M. Das Gupta, Assistant Professor of Protozoology at the School, for valuable help in the examination of blood films, taking of cultures, etc., in connection with the work. The enquiry was thus finally started on the 28th June, 1924.

It had been pointed out to the senior writer by Major J. A. Sinton, V.C., I.M.S., in a private communication in 1922, that the known distribution of the sandfly, *Phlebotomus argentipes*, in India appeared to coincide with that of kala-azar. Without Major Sinton's most willing help and assistance, this enquiry would not have been possible. He has taken endless trouble in identifying sandfly species for us, preparing type mounted specimens, supplying information with regard to identification and distribution of species, and has made several valuable suggestions; and our most grateful thanks are due to him in this matter.

On the 21st June, 1924, Mr. T. Bainbrigge Fletcher, M.A., F.E.S., F.Z.S., Imperial Entomologist, Agricultural Research Institute, Pusa, very kindly accompanied the senior writer and Dr. Chandler of the School on a tour of investigation throughout areas A and B respectively. It was felt that the observations made by a distinguished entomologist who was unbiassed in favour of any one particular view of the transmission problem would be of very great help and value. At this tour it was noted that sandflies occurred in both areas, but they appeared to be more numerous in the endemic area; whilst breeding grounds for Culicoides were almost completely absent from the non-endemic area, but very prevalent in the endemic area. It appeared that the two most likely classes of blood-sucking insects upon which to concentrate attention were sandflies and Culicoides. In connection with the latter group, we have to acknowledge most gratefully the very great kindness of Mr. Bainbrigge Fletcher in identifying species, preparing type mounted specimens, and in helping the enquiry in every possible way.

It is not the purpose of this paper to record the earlier experiments and work carried out by the ancillary enquiry. Three species of sandflies have so far been encountered in Calcutta; *P. minutus*, together with its variety *niger*, *P. argentipes*, and *P. squamipleuris*, the last in very scanty numbers. *P. minutus* has been present in both areas A and B up to the end of October, but *P. argentipes* did not appear upon the scene until late in July, and was especially prevalent in the endemic area in September and October. Of the Culicoides, seven species have been encountered to date, two of which are apparently new. A new technique for the breeding and feeding of sandflies, suitable for use in the hot, damp climate of Calcutta during the rains, has been worked out by the third author and will form the subject of a separate communication by him later. The work has been very heavy, and observations are steadily accumulating.

In view of the work by Acton (1919) on the correlation of the sites of Bagdad boils with those of sandfly bites, and the work by the Sergent brothers, Parrott, Donatien and Béguet (1921) on the transmission of oriental sore by sandflies, also in view of Major Sinton's observation with regard to the apparent identity of the geographical distribution of *P. argentipes* and of kala-azar in India, special attention was paid to this insect. The earlier work with *P. minutus* had entirely negative results; in fact we have not yet succeeded in getting this species to feed on man at all. Its favourite host appears to be the gecko.

The following positive results with *P. argentipes*, however, appear to be worthy of record, even at this early date. In passing it may be noted that, in examining the patient's blood to determine the intensity of the infection in the peripheral circulation, the technique for thick blood films advocated by Knowles and Das Gupta (1924) was adopted. The seven patients upon whom the flies were fed were unselected cases in hospital which had not yet received any treatment.

Experiment 1.—20th September 1924. Six female laboratory bred out *P. argentipes* were fed upon the arm of a patient with kala-azar, whose thick blood films subsequently shewed scanty parasites present. They were kept at room temperature, and were dissected on the 24th, approximately 72 hours after the feed. In the fore-gut of one, typical and motile herpetomonad protozoa were found, some 5 to 6 in number. A culture was attempted on N.N.N. medium, but unfortunately became septic. The remaining five fed flies were negative.

Experiment 2.—26th September 1924. Twelve laboratory bred female *P. argentipes* were fed upon the arm of the same patient as in experiment 1. Four only fed during the night. One was dissected on the 29th, with negative results. The other three were found dead inside the mulmul netting on the morning of the 30th and were at once dissected. In all three, herpetomonad flagellates, in every way resembling *L. donovani* flagellates, were found in the fore-gut, in number varying from 6 to 10.

Attempts were made to obtain stained preparations, but were unsuccessful. A white mouse was injected intraperitoneally with the contents of two of these guts. It died upon the 15th day after injection; examination of the viscera failed to shew any Leishmania; the spleen, however, was enlarged, and there were areas of necrosis in the liver and kidneys. Result; inconclusive.

Experiment 3.—23rd October 1924. Four laboratory bred female *P. argentipes* were fed upon the arm of the same patient as in experiments 1 and 2, on the night of the 23rd/24th. On dissection on the 27th, some 72 hours later, active herpetomonads were found in the fore-gut of two, some 6 to 18 in number in each. Again, attempts to secure stained specimens and cultures were with negative results. The remaining two flies, dissected on the 28th, were negative.

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Experiment 4.—24th October 1924. A batch of eight laboratory bred *P. argentipes* was put to feed at night on the arm of a patient with kala-azar, in a thick blood film from whom only one parasite had been encountered. Of these, 4 were males, and did not feed; the other four were females, of whom two became engorged with blood, and two shewed only traces of blood in the mid-gut. The two engorged flies were dissected on the 29th. Both shewed from 40 to 50 motile herpetomonads,—many rather sluggish in movement—in the fore-gut and anterior part of the mid-gut. The other two flies, dissected on the 30th, shewed no parasites.

Stained preparations from the first two flies were obtained by osmic acid fixation and Giemsa's staining, and shewed typical herpetomonads, exactly resembling those of *L. donovani* as seen in preparations from a culture on N.N.N. medium.

Experiment 5.—25th October 1924. A batch of laboratory bred female *P. argentipes* was fed upon the arm of the same patient as in experiment 4. Four fed. One was dissected upon the fourth day with negative findings. The remaining three were dissected upon the fifth day. One shewed very scanty herpetomonads in the fore-gut. The second shewed an intense infection, with masses of herpetomonads in both the fore-gut and mid-gut, and even a few in the hind-gut. The contents of the dissection were aspirated into a hypodermic syringe and administered subcutaneously to a monkey, *M. rhesus*, three-quarters of whose thyroid gland had been removed at a previous operation in order to lower its resistance to disease, and to experimental infection. The third fly gave negative results. The monkey is still under observation.

Experiment 6.—26th October 1924. A batch of laboratory bred *P. argentipes* was fed upon the arm of a patient with kala-azar. Thick films of this patient's blood did not shew any parasites, but parasites were found on spleen puncture. Two females fed. One was dissected on the 31st and shewed scanty herpetomonads present; the other, dissected the same day, gave negative findings.

Experiment 7.—28th October, 1924. A batch of laboratory bred *P. argentipes* was fed upon the arm of a newly admitted case of kala-azar, in which the diagnosis had not then been confirmed. Next morning two engorged females and one which had taken a small blood meal were collected. All three were dissected on the fourth day. Two shewed scanty herpetomonads present; the third was negative. The case was subsequently proved to be kala-azar upon spleen puncture.

Experiment 8.—10th November 1924. A batch of laboratory bred *P. argentipes* was fed on the arm of a kala-azar patient. The next morning 10 fed flies were found. On the 14th, 3 were dissected; of which 1 shewed herpetomonads present. Four were dissected on the 15th, of which one shewed a heavy infection with herpetomonads present, one a scanty infection; the other two being negative.

Experiment 9.—11th November 1924. A batch of laboratory bred *P. argentipes* was fed on the arm of a kala-azar patient. The next morning one fed female was found. This was dissected on the 16th, but with negative findings.

Experiment 10.—A batch of laboratory bred *P. argentipes* was fed on the arm of a kala-azar patient. The next morning 14 fed females were found. Of these, for some reason or another, 11 died the next day, leaving only 3 available for dissection. These were dissected on the 17th, and 2 of them shewed scanty herpetomonads present.

Experiment 11.—14th November 1924. A batch of laboratory bred *P. argentipes* was fed upon the arm of the same patient as in experiment 10. The next morning 18 fed females were found. Of these 11 were dissected on the 18th, of whom 5 shewed herpetomonads, the infection being a very heavy one in one instance; 7 were dissected on the 19th, of which 2 shewed herpetomonads, one of them having a heavy infection.

The question immediately arises as to what was the source of the herpetomonads seen in the gut of these 25 fed female *P. argentipes*. It may be mentioned that all eleven experiments were consecutive, and that they had been preceded by a series of negative experiments when it is possible that the technique was less satisfactory. It will be seen that the percentage of positive findings is extraordinarily high; no less than 25 out of 56 fed flies being infected, and in six instances heavily infected. Were these herpetomonad forms developmental forms of *L. donovani* or natural herpetomonads of the sandfly species concerned ?

According to Shortt (1924), the natural protozoa of sandflies hitherto encountered are as follows:—

(*a*) A Monad, which is probably not a protozoon at all, but a mistaken interpretation of the spermatozoa of the sandfly.

(*b*) A Crithidia, which is probably a developmental phase of *Trypanosoma hemidactyli* of the gecko; found in *P. minutus*.

(*c*) *Herpetomonas phlebotomi* Mackie (1914); found in 7 out of 65 female *P. minutus* (identified by Patton as such), and in considerable numbers; although this author failed to find any corresponding herpetomonad in the gecko lizard which is the natural host of *P. minutus*. As far as we are aware, up to the present date and from a careful search of the literature, this finding of Colonel Mackie's remains an isolated one. It is also to be noted that it occurred in the heavily kala-azar infested district of Nowgong, Assam.

Controls.—The parasite encountered in these 25 positive female *P. argentipes* was an undoubted herpetomonad, both in its movements, its characters under dark ground illumination, and in stained preparations, and morphologically similar to that of *L. donovani*. It had been realised from the very outset of the enquiry that a very extensive examination of the insects worked with with regard to their natural protozoa would have to be carried out. Up to the date of writing (22nd November 1924), the following sandflies have been dissected and examined as controls. (By "dissected" is meant that the entire alimentary tract was dissected out and all its parts examined.)

"Sandflies", nothing recorded as to species and sex	103
P. minutus, males	207
P. minutus, females	94
P. argentipes, males	317
P. argentipes, females	90
Total ..	811

Of these, 38 of the *P. argentipes* were males and 15 females bred out in the laboratory, all the remainder being flies captured in the wild state. Of the 94 female *P. minutus* captured and examined, 4 contained ingested reptilian blood; and of the 75 female *P. argentipes* captured and examined, 8 shewed

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ingested blood, in each case of mammalian origin. The habits of the two species, indeed, appear to be entirely different, *P. minutus* preferring the lizard as its natural host, and *P. argentipes* preferring mammalian blood.

The protozoal and other parasites encountered in the dissection and examination of the above 811 flies were as follows:—

(*a*) A form resembling a Rickettsia in the rectum of a male *P. minutus*.

(*b*) On three occasions a typical Bodo in the rectum of male *P. minutus*; on two of which occasions the parasites were grown in Boeck's medium and gave cultures of a typical Bodo, with a large nucleus, a kinetoplast, a short anterior flagellum and longer trailing posterior flagellum, as seen under the dark ground and in stained preparations.

(*c*) On one occasion what appeared to be a spirochæte in the rectum of a male *P. minutus*, but which failed to shew up in the stained preparations from this material.

In none of the 811 sandflies examined as controls has anything resembling a natural herpetomonad been found; and this includes 407 *P. argentipes*, identified as such.

On the other hand, the eleven experiments were consecutive and included only one failure. In six of the flies the infections were surprisingly heavy. In experiment 7 a tentative diagnosis of kala-azar was made as the result of the sandfly feed, even before it had been confirmed by finding the parasite on examination of the patient's spleen puncture film.

Fed Controls.—In addition to examination of wild flies and of unfed laboratory bred ones, the following control experiments were carried out with female, laboratory bred out *P. argentipes*, fed upon persons not suffering from kala-azar:—

Control Experiment (*a*).—4th November 1924. Flies fed on a patient with malaria. 3 fed. One was dissected on the 7th, and 2 on the 8th. No protozoa found.

Control Experiment (*b*).—5th November 1924. Flies fed upon a patient suffering from dysentery. 3 fed, and were dissected on the 9th. No protozoa found.

Control Experiment (*c*).—7th November 1924. Flies fed upon a patient with asthma. 11 fed, and were dissected on the 12th. No protozoa found.

Control Experiment (*d*).—15th November 1924. Flies fed upon a case of rat bite fever in hospital. 3 fed, and were dissected on the 19th. No protozoa found.

Control Experiment (*e*).—16th November 1924. Flies fed upon the same patient as in Experiment (*d*). One fed, and was dissected on the 20th. No protozoa found.

Control Experiment (*f*).—17th November 1924. Flies fed upon a patient with malaria. 8 fed, and were dissected on the 20th. No protozoa found.

Control Experiment (*g*).—18th November 1924. Flies fed on a patient suffering from endocarditis. 17 fed, and were dissected on the 22nd. No protozoa found.

Thus no protozoa and no herpetomonads were found in any of the 46 female *P. argentipes* fed upon patients suffering from diseases other than kala-azar. These 46 may be added to the previous 811 control flies, bringing up the total number of the controls to 857.

The conclusion appears to be irresistible that this herpetomonad is the herpetomonad form of *L. donovani*. If this is so, the gut of the female *P. argentipes* forms a cultural environment for *L. donovani* far and away more favourable than any artificial culture medium that we know, and very much better than the mid-gut of the bed bug.

This report, however, is of a purely preliminary character only, and it is not intended to lay down any hypothesis as to the mode of transmission of kala-azar. The observed facts are recorded in the hope that they may be of use to other experimental workers in the field. It only remains to add that, during the period covered by these investigations, the wet bulb thermometer readings were approximately as follows:—

Experiments 1 *and* 2. 20th to 30th September, 80° F. with a standard deviation of less than 1° F.

Experiments 3 *to* 7. 23rd October to 1st November, 70° F. to 75° F.

Experiments 8 *to* 11. 10th to 19th November, 65° F. to 75° F.

Our most grateful thanks are due to Major H. W. Acton, I.M.S., for constant help and assistance. Also to Lt.-Colonel S. R. Christophers, C.I.E., I.M.S., Director of the Kala-azar Commission, in association with which the ancillary enquiry is being carried out, for his very kind permission to publish this preliminary note in the *Indian Medical Gazette* in order to ensure its early publication.

Conclusions.

1. In ten out of eleven consecutive experiments, female laboratory bred *P. argentipes*, fed upon the parasite-containing blood of kala-azar patients, shewed typical herpetomonad forms in the fore-gut or mid-gut at the third to the fifth day after the feed. No less than 25 out of 56 such fed flies shewed herpetomonads, and in six instances the infection was a heavy one, although the patient's blood films had shewn only scanty *L. donovani* present.

2. On dissection and examination of 811 control sandflies, including both *P. minutus* and *P. argentipes*, the only natural infections encountered have been once a Rickettsia, three times a Bodo, and once a doubtful spirochæte. Nothing resembling a herpetomonad has been encountered.

3. On dissection and examination of 46 other control female *P. argentipes* fed upon persons not suffering from kala-azar, no protozoa were found.

4. It is concluded that *L. donovani* passes into its flagellate form in the gut of *P. argentipes* under suitable conditions of atmospheric temperature and humidity. Any further conclusions with regard to the kala-azar transmission problem, however, are at present carefully avoided. What is wanted is further work, which is now in progress, rather than speculation.

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ANKYLOSIS OF JOINTS.*

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I AM showing to-night a series of cases which are examples of a class of surgical work for which there is almost unlimited scope in India. One can hardly drive down a busy street of any Indian city without seeing some examples of crippled limbs, the result of disease or injury, which are capable of restoration to useful function by orthopædic methods. It is work which consumes a great deal of time, involves repeated operations, and necessitates infinite care and attention to small details of treatment if success is to be attained. The results, however, are so striking and gratifying, both to patient and surgeon, that they are well worth the trouble involved. I have often been told that Indian patients will not submit to prolonged treatment and repeated operations, and to a certain extent this is true, so that it is advisable to take the shortest cuts which will lead to a reasonably good functional result, rather than to adopt more tedious methods which may possibly in the end give a more perfect result. My personal experience is that these patients will submit to prolonged treatment, provided that it is not too painful, and that they have visible evidence of steady progress. It is this latter point which is so important and which makes it imperative to study each case as an individual problem and to select such methods as will provide easily demonstrable improvement from the very start of treatment. In this branch especially the psychology of the patient must be considered, and the great value of a few convalescent cases walking about the ward in caliper splints to impress the new comers cannot be over-emphasised.

In Europe, prior to the war, joints ankylosed in bad position were not very common, as care was taken that, when a joint had perforce to be allowed to ankylose, it did so in good position. When ankylosis in faulty position occurred it was usually the result of neglected tuberculosis, and the methods of dealing with the condition had become stereotyped and gave satisfactory results. In India, however, we have to deal with neglected cases of other inflammatory and traumatic conditions besides tuberculosis, and it was not easy to obtain satisfactory guidance as to how to proceed in these cases. The war, however, gave a tremendous impetus to orthopædic surgery, and the study of enormous numbers of cases of infected compound fractures and infective arthritis led to great improvements in methods of dealing with stiff joints. Among those who have contributed to the recent advances in orthopædic methods the name of Sir Robert Jones stands out pre-eminent; it is impossible to over-estimate the debt which this branch of surgery owes to him; no matter what kind of orthopædic case one undertakes to treat, one will find that some original idea or method of his holds the field and is almost universally accepted.

Classification.—The old classification of ankylosis of joints into "true" and "false," according as to whether they were dependent on intra-articular fibrosis or extra-articular contracture, has given place to a much more elaborate classification, based on the true pathology of the condition and differentiating the various structures which may be involved, from the skin which may be contracted from ulceration or the healing of septic wounds, down to the bones which may be ankylosed, deformed by a mal-united fracture or obstructed in their movements by masses of callus. This classification is both accurate anatomically and useful for teaching purposes, but in practice it is difficult to apply, as the majority of the cases present lesions which fall under two or more headings. A slight modification of the old classification, which I find useful clinically, leaves old fractures and dislocations on one side for special treatment, and divides up stiff joints as follows:—

1. Cases in which the pathological process (disease or injury) started outside the joint. This comprises all cases of contractures of skin and muscle and periarticular fibrosis, the results of septic compound fractures. The primary attack will have to be made on the structures outside the joint, the adhesions in the latter being light do not usually present

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any great obstacle. Tenotomies will be called for early in the treatment and a movable joint will be the goal aimed at. These cases are distinguished from the next group by the presence of a certain range of painless movement.

2. Cases in which the primary process started within the joint, the contracture of surrounding structures being secondary. Here the primary attack must be made on the joint. The majority of the cases of bony ankylosis which one meets within India are due to suppurative arthritis, often complicating septic osteo-myelitis, whilst dense fibrous ankylosis usually owes its origin to gonorrhœa. This fact is apt to escape detection as the attack of gonorrhœa was often many years ago; it may be denied altogether and there are no obvious sign. Microscopical examination of the films of prostatic secretion obtained by massage of the prostate and seminal vesicles will furnish, in the shape of an abundance of polymorphonuclear leucocytes, where there should be practically none, the key to the ætiology of many a case which would be otherwise obscure. It is well-known that gonorrhœal synovitis has a great tendency to the formation of dense adhesions, and cases are occasionally met with in which bony ankylosis has resulted.

The comparative rarity of ankylosis as the result of tuberculosis in this counrty is noteworthy. Whether bone and joint tuberculosis is actually rarer in this country than in Europe is difficult to say, but it seems as though this disease, when it does occur, has a tendency to progress and destroy life, rather than to result in spontaneous cure by fibrosis.

The Aims of Treatment.

(1) To restore movement or to increase the range of movement already present.

(2) Where no restoration of movement is possible to place the joint in the most useful functional position.

(3) Where there is a small range of painful movement, to secure a stable and painless limb by bony ankylosis.

Bony Ankylosis.

This being the simplest problem will be taken first. Bearing in mind our "aims of treatment" heading, (2), it is obvious that if the joint has ankylosed in a good position we should leave it alone. The modern operation of arthroplasty, which aims at the reconstruction of a movable joint, is a tempting procedure, but it has several grave drawbacks. It demands the very highest grade of surgical technique, failure will leave the patient worse off than he was before, and the after-treatment is a long "via dolorosa" of pain, calling for great fortitude on the patient's part. I will here quote some weighty remarks of Sir R. Jones; speaking of arthroplasty of the knee he says: "many cases operated upon by various surgeons have been examined by the authors, in the larger proportion of which the joint would have been much more useful if it had been left alone." Speaking of the hip, the same authority says: "apart from the exceptional cases where a patient insists that movement is more important to him than stability, mobilizing operations should be confined to cases of double ankylosis and cases of unsound ankylosis with adduction. In the latter case the patient should understand that a sound ankylosis can be secured by operation with greater certainty than can a satisfactorily movable joint." There are conditions in which arthroplasty is desirable, such as

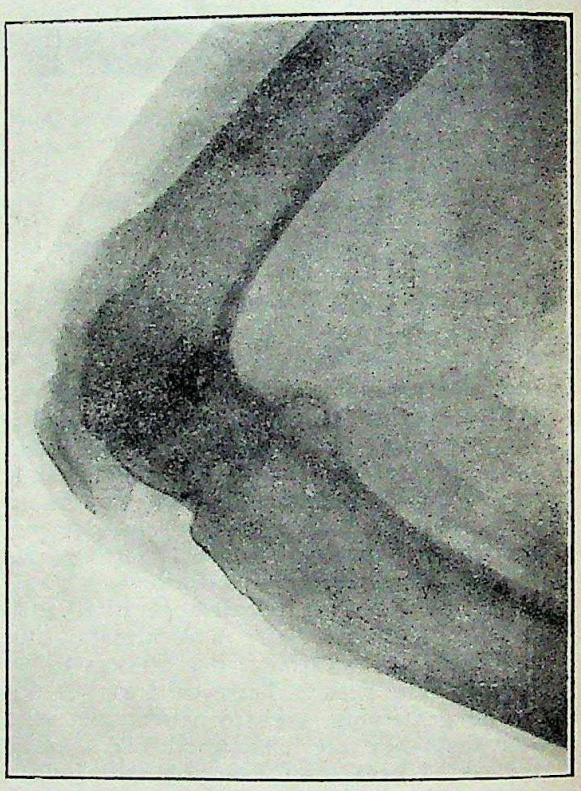

Fig. 1.

ankylosis of both shoulder and wrist or double ankylosis of the hips mentioned above, but on the whole we may say that a sound ankylosis in good position is not a thing to be lightly interfered with.

If, however, the joint be ankylosed in a bad position, we must interfere to restore function to the limb. The methods applicable to each joint have been more or less settled, but nevertheless each case presents an individual problem. It may be laid down as a general rule that in the presence of recent sepsis or tuberculous disease it is not safe to interfere with the joint itself. Deformity should be corrected by an osteotomy, placed some

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distance from the joint. In quiescent cases, however, this does not apply; and the most direct route to attain the desired correction may be taken.

Case 1, admitted to the Campbell Hospital on the 12th November 1923, is a common type. He had an attack of infective osteomyelitis of the femur one year ago, for which he underwent operation in Bombay. Healing was complete six months ago, with the knee joint flexed to a right angle. The *x*-ray (Fig. 1) shows bony ankylosis of the joint. There were numerous soundly healed scars in the thigh, but no scar indicating that the knee joint had ever been opened. A cuneiform osteotomy was performed on the usual lines on 21st November, 1923, and the first difficulty was here met with. In cases in which the knee joint has been in a

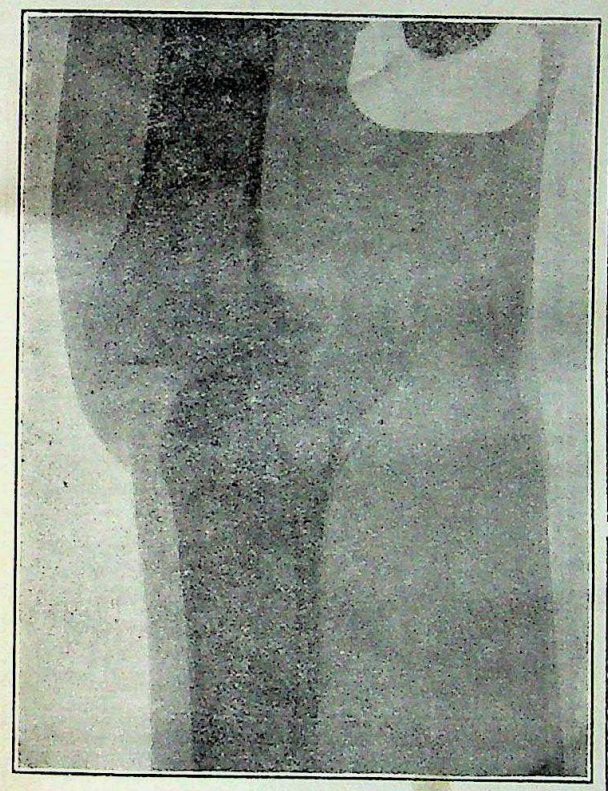

Fig. 2.

position of right-angle flexion for some time, the popliteal artery, together with nerves and tendons, have undergone shortening. To put the artery suddenly on the stretch is to risk such diminution of its calibre as will endanger the blood supply of the limb, and there are instances on record where gangrene has resulted from this procedure. To obviate this danger two courses are open, (*a*) to remove more bone with resulting excessive shortening, or (*b*) to bring the leg down gradually to the fully extended position. The latter course was adopted, the leg being brought to an angle of 30° of flexion. A week later, the wound having healed, stitches were taken out, the limb was brought down to 15° and put up in plaster of Paris. At the next sitting, a week later, the angle was reduced to 7°, and full correstion was attained a month afterwards. The amount attainable at each sitting was determined by the pulse in the tibial arteries, the limb being extended till the pulse began to be enfeebled, at which point the plaster case was applied. The plaster splint was removed two months later and walking was started. The final shortening in this case was 1½ inch. The *x*-ray (Fig. 2) shows a good deal of backward displacement of the tibia. This is an inevitable drawback of the method of straightening in stages adopted in this case. Provided that it still allows of fair weightbearing surfaces of tibia and femur being in contact, it is not of much importance, but it may be of such a degree as to necessitate the section of the hamstring tendons or the removal of more bone to overcome it. This is one of the points which must be considered and decided at the original operation.

Case 2, was admitted into the Campbell Hospital on 9th April, 1924, with flexion of the hip joint to a right angle, the knee joint being quite unaffected. He gave a history of gonorrhœa 8 years ago, with repeated mild attacks of arthritis, culminating 2½ years ago in a very acute attack in the left hip, which left the joint in its present position. No movement whatever could be detected under anæsthesia and the *x*-ray showed no joint line. Osteotomy was obviously indicated and the best method for this case had to be decided. The original operation for correction of his joint deformity was Adams' osteotomy, in which the neck was cut through between the trochanter and the head. This was abandoned because, the majority of the cases and ankylosis being due to tuberculous disease, there was often no neck left to cut through and, even if there was, the section passed dangerously near the site of the disease. Gant's subtrochanteric osteotomy replaced Adam's operation, but had the disadvantage that in cases of extreme flexion a very wide gap was left between the fragments of the femur. Jones' trans-trochanteric operation gives the most accurate mechanical results and is now the favourite operation, but is rather more difficult to perform. In the present case Adams' operation seemed the most suitable, there was no fear of lighting up old bone disease and after division of the neck, the lower fragment had only to be rotated in the axis of the neck to correct the deformity. The operation was performed on 22nd April, 1924. A vertical incision above the great trochanter allowed of an osteotome being passed down to the neck, which was divided, with immediate full correction of the deformity and the limb was put up in a plaster of Paris splint. Two months later the splint was removed. The *x*-ray (Fig. 3) shows the section line consolidating though still somewhat weak, and Fig. 4 shows the patient walking on crutches with a patten on the sound foot.

FIBROUS ANKYLOSIS.

Here we have to tackle a much more difficult problem, viz., the decision as to whether we should try for a movable joint or aim at fixation,—heads (1) and (3) of "aims of treatment." H. O. Thomas has introduced a useful clinical classification of cases of fibrous ankylosis into:—

(1) *Sound ankylosis,* which denotes the absence of active disease and implies fully organised fibrous tissue, in which the angle of deformity does not alter by use.

(2) *Unsound ankylosis,* which denotes active disease, although it may be of a very chronic or painless type. The deformity accompanying an unsound ankylosis can usually be corrected by mechanical means and its treatment is absolute fixation until the inflammation has disappeared, when it becomes a sound ankylosis.

To the above may be added the following points:—

(1) Stiffness from disease implies pain and rigidity on movement in all directions. Pain

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in such a joint is most marked when the body weight is put upon it and there is usually a local rise of temperature. Such joints require fixation until the disease is quiescent.

(2) Stiffness from adhesions implies pain and rigidity on movement only in that direction which puts the adhesions on the stretch, in other directions movement is normal. The examination must, of course, be made without an anæsthetic. The range of movement in such joints should increase with use or at least should not diminish. The site of the adhesions can often be localised by the finger and the temperature of the joint is not raised.

The method of handling each case must be decided by the application of these principles, the essential points being that in the presence of active disease rest and fixation are indicated, whilst in quiescent cases we may interfere as actively as anatomical conditions allow. Should such interference lead to recrudescence of active disease, we must cease and fix the joint for the time being, resuming later. Should repeated attempts at mobilisation result in failure we then have to deal with the case as under head (3) of "aims of treatment," that is to say we should sacrifice the small range of painful movement in favour of a stable joint, an object which is best attained by the operation of arthrodesis. It is in this class of cases especially that the value of the "short cut" is so obvious in Indian hospital practice. The mobilisation of a painful stiff joint is a long, agonising process, which is often disappointing in the end through lack of co-operation on the part of the patient. It should not take long for the surgeon to make up his mind that he is dealing with a case of this sort, and he should in such circumstances proceed to an arthrodesis, which with its painless convalescence will give a result with which both patient and surgeon will be well satisfied. If the patient can face the necessary after-treatment, an arthroplasty may be considered.

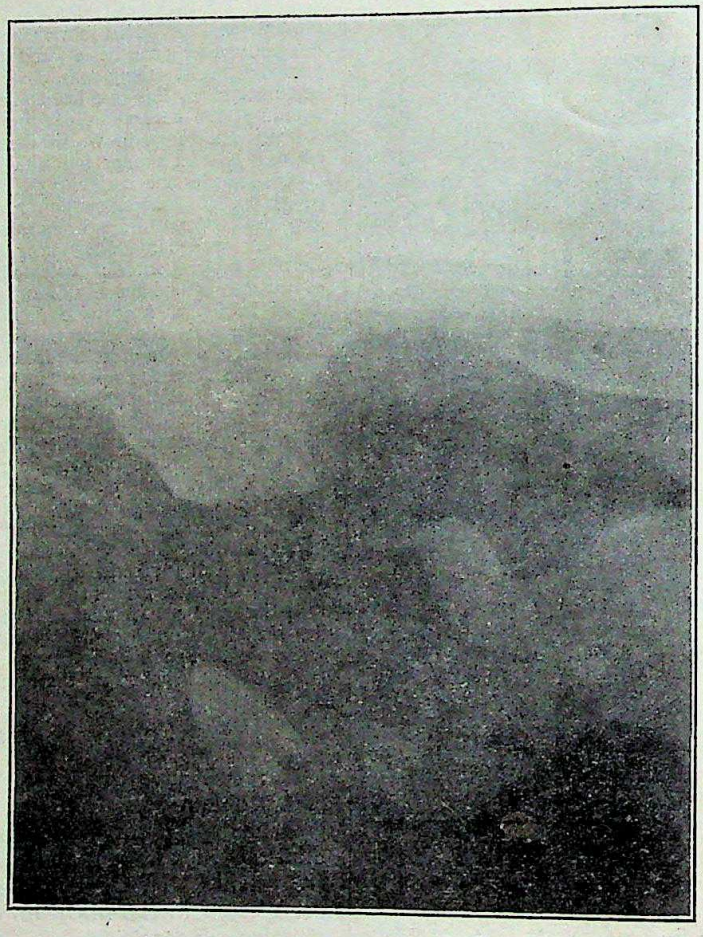

Fig. 3.

METHODS OF MOBILISING STIFF JOINTS.

(1) Physio-therapeutic methods, hot baths, paraffin baths, diathermy, massage and passive

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movements are applicable to all cases at different stages.

(2) Full movement under an anæsthetic is an excellent method in cases of slight adhesions.

Fig. 4.

Fig. 5.

(3) Movement in stages, rupturing adhesions but stopping short each time of setting up a reaction, and resuming when the amount of movement gained at the last stage is permanently maintained. This method is applicable to moderately severe cases.

(4) Gradual alteration of position by extension and splints. This is not a satisfactory method. Extensions slip with excoriation of the skin and splints cause pressure sores. It is useful in the milder cases, but ineffective in bad cases. It is very irksome to the patient and in my experience is badly tolerated.

(5) Forced movement under anæsthesia to as great a degree as possible, followed by immobilisation in plaster of Paris. The pain

Fig. 6.

caused by this procedure is considerable and requires morphia, but it is not of long duration. The process is repeated as often as necessary, a little being gained each time. Tenotomies are performed as required, when the deformity is fully corrected the plaster splint is removed and mobility is attained by method (1), usually a protracted process. This method, though tedious, is the method of election for severe cases, since it is comparatively painless and the improvement after each operation is obvious to the patient.

Case 3, admitted to the Campbell Hospital on 8th November, 1923. This was a case of gonorrhœal arthritis of 4 years' duration. The left hip and knee were both flexed to a right angle, with a few degrees of movement

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in the hip joint and rather more in the knee joint. There was microscopic evidence of old prostatitis. On 20th November, 1923, the hip was brought down to an angle of 30° and fixed. On 1st December, 1923, the muscles attached to the anterior superior and anterior inferior iliac spines were divided and the hip was brought down nearly straight. Two more anæsthetic sittings were necessary before full correction was obtained and both hip and knee were straightened. At the end of three months the plaster splint was removed and the patient started to walk. A fair degree of flexion was obtainable at the hip, but the knee proved incapable of weight bearing and became swollen and painful. A modification of Jones' caliper splint was made for him in which the fitting of the caliper into the heel of the boot was replaced by an extension anklet attached to the end of the splint, the patient walking on the rubber-shod end of the splint with a patten on the sound foot, to balance the length of splint requisite to take the extension. The action of the extension kept the ends of the bones from contact, and with the weight carried on the tuber ischii and fair movement of the hip, the patient was enabled to walk for the first time for four years. Fig. 5 shows him wearing the splint.

Case 4, is of a similar character, in which both hips and both knee joints were ankylosed in acute flexion. He is still in the early stages of treatment and is in his plaster splint. The backward displacement of the tibiæ is here a marked feature, as is usually the case where there is extreme flexion. Lengthening of all the hamstring tendons will have to be done in this case.

Fig. 6 illustrates the extraordinary conditions with which one may have to deal in this country. This patient was gored in the knee joint by a buffalo and of course developed septic arthritis. The joint has healed up, but the tibia has been dislocated backwards, as shown in the *x*-ray (Fig. 7). An excision must be done, though it will involve considerable risk of lighting up infection, and the shortening will of course be very great.

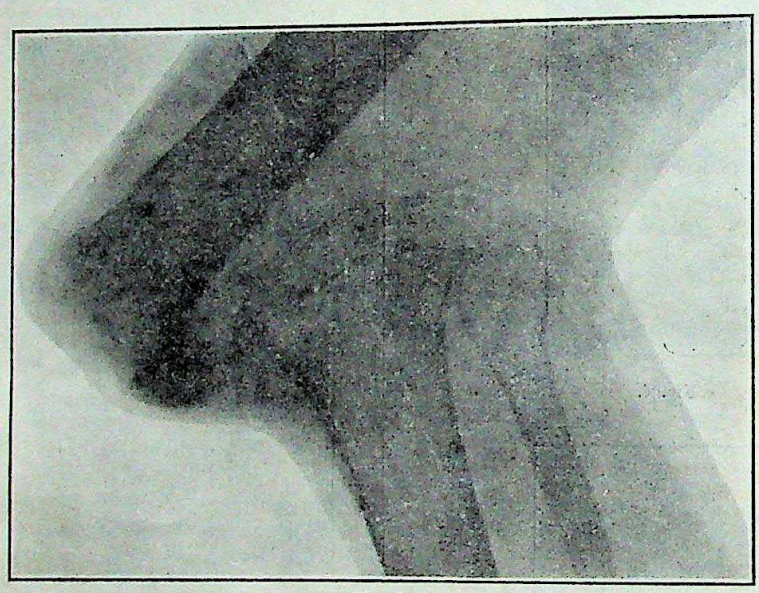

Fig. 7.

SOME USES OF "E. C." IN HOSPITAL WORK.

By A. H. NAPIER, M.D.,
MAJOR, I.M.S.,
Civil Surgeon, Muzafferpur.

E. C.—Electrolytic Chlorine—has been used in the Sadar Hospital, Muzafferpur now for more than two years. It has superseded for general work all other disinfectants and is used in the wards, dispensary and operating theatre.

I use E. C. in the following strengths:—

1. Pure.
2. 1 drm. to 1 pint.
3. 2 drms. to 1 pint.

Cases are prepared for operation as follows:—

Afternoon before operation:—

(1) The operation site is shaved; (2) washed with soap and water; (3) swabbed down with pure E. C., and (4) a compress of E. C., 1 drm. to 1 pint, applied.

Before operation:—Swab down with pure E. C.

Under this treatment the patient's skin is not discoloured, nor does the skin blister or peel off.

The operator and assistants sterilize their hands as follows:—

1. Wash well with soap and water, using the nail brush.

2. Soak the hands in E. C., 1 drm. to 1 pint, with two to three minutes' cleaning round the finger nails with gauze while the hands are immersed in the solution.

I have had no reason to be disappointed with this method of preparing cases and my results as good as I got when using longer and more tedious methods of sterilization.

The continuous use of E. C. does not affect the operator's hands.

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Since 1900 after South Africa I get in the hot weather cheiropompholyx, and develop dermatitis when I use carbolic acid or perchloride of mercury. During 1923 and 1924, while using E. C., I have remained free from both cheiropompholyx and dermatitis.

Bone Cases:—These are common and I now tackle them with the utmost confidence. I think E. C. gives me better results than any other methods I have seen, used or employed.

Aseptic Case.

Middle aged male. Right patella fractured one month ago. Non-union and synovitis present. Kept in bed until the swelling had subsided. Patella sutured after preparation mentioned above. Result—primary union.

Conversion of Compound Fractures into Simple Fractures.

These cases come into hospital as a rule 12 to 18 hours after the injury has been inflicted; but I have employed the following method up to three days after the injury if the local condition is good.

On admission to hospital, without washing put on an E. C. compress, 1 drm. to 1 pint.

On the operation table, protect the wound with a plug of gauze soaked in pure E. C. and then clean the skin around the wound with E. C., 1 drm. to 1 pint, and then with pure E. C.

The wound is then swilled out with pure E. C., care being taken not to rub in any dirt, etc.

After this, the margins and wound surface are dissected out, loose bones removed and edges of broken bone refreshed, enlarging the wound if necessary.

The wound is then thoroughly swabbed out with E. C., stitched, and a dry dressing applied and then put up in splints and dressed daily with E. C.

Case 1. Compound fracture of left ulna and dislocated elbow. Operated on 10-4-23; discharged 20-5-23 with good union.

Case 2. Compound fracture of left ulna. Operated on 2-5-23; discharged 17-6-23.

Case 3. Compound fracture of left ulna. Operated on 13-4-23; discharged 5-5-23.

Case 4. Compound fracture of left radius and simple fracture of right radius and ulna. Operated on 17-6-23; discharged 8-7-23.

Case 5. Compound fracture of lower third of the left tibia and fibula. Operated on 10-5-23; discharged 19-6-23.

Case 6. Compound fracture of lower third of the right tibia. Operated on 18-2-23; discharged 3-4-23.

The dates speak for themselves. The cases left with good union and satisfactory limbs.

Septic Bone Case.

Case 1. J. R. Injured 31-12-23. Operated on 2-1-24; discharged 13-2-24. This was a case of compound fracture of the right tibia in the lower third, with the whole leg swollen and septic and much pus oozing from the wound.

Treated as for converting compound into simple fracture, but with the wound left open. Constant irrigation employed for a week using only two douche cans and two nozzles with E. C., 1 drm. to 1 pint. After this, dressed daily with E. C.

Case 2. Female. Fracture of both bones in their lower third; right leg. Injury 3 months before admission to hospital, non-union and septic sinuses leading to bare bone.

Treated by enlarging the wound, removing dead bone, and swabbing out with pure E. C. by the routine method. Constant irrigation for ten days and then daily dressing. The case left hospital with good union in ten weeks. Could not be persuaded to remain longer.

All outdoor cases are dressed with E. C., 1 drm. to 1 pint. Most cases do well, but chronic tuberculous ulcers and syphilitic lesions do not heal so rapidly under E. C. as under perchloride of mercury. Apart from such cases, E. C. is the cleanest and most rapid disinfectant for general work.

The following case shows its powers of preventing sepsis.

Govind Singh, aged 55, wounded by *gandesha* four hours before admission to hospital. A flap 7 in. long by 5 in. deep had been made over the junction of the upper and middle third of the right scapula. The scapula had been cut through.

Wound swabbed with pure E.C., five pieces of bone removed and the edge of wound refreshed, deep stitches through muscle applied and the wound closed without a drain. The wound healed by primary intention and the case had no fever.

Carbuncles.—Six patients were treated with one death. In this case the local condition improved but death was due to pyæmia. In four cases no knife was used; healing took place under E. C. compresses 1 drm. to 1 pint.

Case 1. Old man. Trace of sugar in urine, carbuncle 8 in. by 5 in., oozing pus from four or five sinuses. Hot compresses, E. C. 1 drm. to 1 pint, were applied night and morning and then E. C. dressings. Improvement noticeable in 24 hours. The sloughs disappeared in four days and granulation commenced about the 6th day. Healing was slow as skin grafting was refused.

Cancrum Oris in Kala-Azar.—Pure E. C. checks the spread of the disease and lessens foetor. This deodorant action of E. C. is well marked in all septic cases and makes them pleasanter to treat and dress.

E. C. applied pure, then E. C. dressings, 1 drm. to 1 pint. Mouth wash 3 drms. E. C. to 1 pint given.

If pure E. C. reaches the uvula and pillars of the fauces, slight dyspnœa is produced, but this rapidly passes off.

Erysipelas.—Patches painted with pure E. C. night and morning and then ichthyol and belladonna applied.

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Three cases treated, the longest duration being 16 days. The cases appeared to run a shorter course than usual.

Tuberculous Glands of Neck and Axilla.—These always come in late with glands broken down and often with sinuses. These cases are prepared in the usual way, the glands removed as thoroughly as possible and then the operation site swabbed with pure E. C. and the wound closed, leaving in a gauze drain for 24 hours. I expect primary union.

These glands behave differently to tuberculous and syphilitic ulcers.

E. C. has been employed as an eyewash and as a douche in otitis media. The results were satisfactory, but no records were actually kept.

In the district, I have seen it used to abort boils by applying a match-end moistened in E. C. to the boil. This was done successfully.

A few drops in half a cup of water is useful in pyorrhœa and I have had favourable reports of its use.

For prickly heat, E. C. in the bath is useful. I have not used E. C. for this and the last three mentioned conditions myself, but am told that it is extremely good

In private work, I use it in my midwifery cases as a douche, for sterilising my hands, and for cleaning up the patient.

It has proved in my hands the best general disinfectant that I have used. I have certainly had much less sepsis since using E. C., but have had a few failures.

Case 1. Strangulated hernia in a man aged 85. Hernia larger than a football. Radical cure. Case had cystitis. The wound became septic in 24 hours and the patient died.

Case 2. Amputation at the shoulder joint after injury 36 hours beforehand. The patient remained septic and died in three days.

Case 3. Kala-azar case with syphilis. The bubo was excised, E. C. 1 drm. to 1 pint and hot compresses applied; no healing. E. C. plus B. I. P. P. was then applied; granulations formed rapidly.

I do not think E. C. can be blamed for the result.

I think I have said enough to show that E. C. is a really first class antiseptic. I am indebted to Mr. Hutchinson for a supply of E. C., and to my Assistant Surgeons, Drs. Saha and Mukerjee for reports, and to my orderly Imam Ali for his care in looking after the cases.

CANINE LEISHMANIASIS IN BOMBAY.

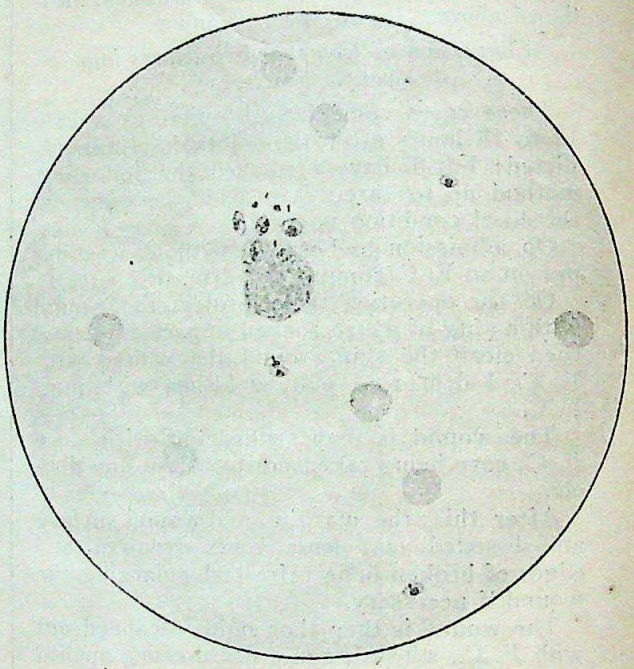
By KHAN BAHADUR C. R. AVARI,
Assistant Surgeon,
and
F. P. MACKIE,
LIEUT.-COLONEL, I.M.S.,
(*Bombay Bacteriological Laboratory.*)

A PARIAH dog living near the Laboratory was noticed to have a superficial sore near the base of one of its ears. Films were made by one of us (C.R.A.) and leishmania-like parasites were found in fair numbers.

The parasites were mostly extra-cellular and were characteristic of leishmania (See figure from a drawing).

The dog was not seen again for some days, and, when caught a week later, the small lesion was found to have healed and there only remained a small nodule partly covered by a scab. The nodule was excised and broken up in saline and rubbed into scarifications on the head of a dog and a monkey.

The possibility of the parasites being a contamination left by fleas or flies was considered, but they had not the morphological characters of herpetomonas cysts such as appear in the fæces of infected insects, but possessed the delicate cell membrane and nuclear structure typical of leishmania.



Leishmania from a Canine sore.

The discovery of canine leishmaniasis or herpetomoniasis in the Mediterranean countries where the infantile type of human leishmaniasis exists was hailed at the time as a discovery calculated to throw light on the transmission of the human disease.

The further discovery that this canine disease could be transmitted from dog to dog through the agency of fleas was by some considered proof that human leishmaniasis was of canine origin and was transmitted by dog fleas. This aspect of the problem received much attention in India at that time, and Donovan examined 1,000 dogs in Madras and Patton about 2,700 also in Madras without finding a single dog affected with visceral herpetomaniasis.

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One of us (F.P.M.) examined over 100 dogs which were living in houses occupied by kala-azar patients in Assam, also without finding any infected animal; and of these the bone marrow of 25 was inoculated into monkeys which remained unaffected. It has not been made clear, however, that as man is—so the dog may be—liable to two types of infection, one the cutaneous affection resembling oriental sore, and the other a visceral infection resembling kala-azar. In any case we are not inclined to place any great importance on the liability of Indian dogs to leishmanial infection, whether cutaneous or visceral.

The opinion is gaining ground that the infection of dogs on the Mediterranean littoral has not the significance in the human disease which was at first placed on it. It is probable that the canine disease is distinct from the human and transmitted only from dog to dog and by the dog flea.

As far as we are aware no case of leishmanial infection of Indian dogs has been previously recorded * and this is sufficient justification for this short notice. It is interesting to note that Bombay is not an indigenous centre for either oriental sore or kala-azar, and on the contrary the absence of the canine disease in the highly endemic areas of Assam, Bengal and Madras is strongly against there being any causative relationship between the two diseases. It would be interesting to make a detailed examination of dogs in Bombay to find out the frequency of this infection, but the matter of chief interest is that the disease actually exists in India as this case proves.

A NOTE ON THE TESTING OF INSULIN IN INDIA.

By J. TAYLOR, D.S.O., M.D., D.P.H.,

MAJOR, I.M.S.,

Assistant Director, Pasteur Institute of Burma, Rangoon.

THE notes which have appeared in the *Indian Medical Gazette* from time to time on the results of animal tests of insulin have shown considerable variations in the findings of different workers. In many cases the tests have been carried out on one or two rabbits only, and with either the convulsing test as the standard, or opinons on potency given on the general result in the reduction of blood sugar without a calculation of unitage according to standard methods. As the results of tests carried out in India and repeated in England with the same material it has been suggested that the rabbits used in India were unsuitable for the purpose. Bose and Acton(1) have investigated the reaction to insulin of a series of rabbits of different breeds and colours and have found the reduction of blood sugar at a single estimation two hours after an injection of a fixed dose per kilo to vary from 45 per cent. to 67 per cent. of the initial blood sugar, with an average of 55 per cent. for the batch of 14 rabbits. The greatest reduction was found in one colour batch.

That response to insulin varies greatly in rabbits, partly in relation to breed and colour and partly as an individual idiosyncrasy, is well known to experimental workers and to manufacturers engaged on its production on a large scale.

McLeod and Orr (2), in a series of tables showing the effect of the same doses of insulin per body weight on a large number of rabbits, found a variation in response even greater than the differences obtained by Bose and Acton. They also found that the response of the same rabbit to insulin varied remarkably from time to time.

The production of hypoglycæmic symptoms cannot be relied on for the standardisation of insulin, except with the precaution of using a large number of rabbits and obtaining results in a proportion of these only.

McLeod and Orr in one series of tests with 14 rabbits obtained convulsions in two only, although in the case of 10 rabbits the blood sugar was below 0.04 per cent. at one or more of the estimations. The period over which some degree of hypoglycæmia will be maintained is of importance and will not necessarily correspond with the production of symptoms. On account of these difficulties in regard to the convulsive tests or to standardising by a fall of blood sugar to a definite point, a method has been worked out for the physiological assay of insulin which depends on the lowering of the blood sugar over a period of five hours, in relation to rabbit weight and to dose of insulin, which is used at less than convulsive amount.

The details of this method of testing are given in McLeod and Orr's paper already quoted, and as used in practice in the manufacture and standardisation of insulin on a large scale have been communicated to me by Dr. Clowes of Messrs. Lilly's Laboratories, Indianapolis. The procedure is as follows:—

Rabbits weighing approximately 2 kilos fed on oats and Timothy grass and starved for 24 hours are used. In testing material of a strength supposed to be 20 units per c.c., as large a batch of rabbits as possible are each given 0.075 c.c. A second batch are given 0.10 c.c. each, and a third batch, 0.125 c.c. The blood sugar is estimated before the injection and again at intervals of 1½ hours, 3 hours, and 5 hours. The average blood sugar figure of these three estimations is taken for each rabbit separately and the unitage

* Films were recently sent to us by a medical colleague in Bombay which were taken from a dog which had contracted an infection in the Punjab, and this sore also was found to be of leishmanial nature. Details of this case will probably be recorded by the dog's owner whose observation preceded ours. His dog, we believe, was an English dog and came from the Punjab, whilst ours was a pariah dog indigenous to Bombay.

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for each rabbit calculated on the following formula:—

$$\frac{\text{Initial blood sugar} - \text{Average blood sugar}}{\text{Initial blood sugar} - 0{\cdot}045} \times \frac{\text{Wt. in kilos}}{\text{Dose in c.cs.}} \times 1{\cdot}5$$

The average for each rabbit having been calculated, the average of the batch is then estimated. The average of the three batches is then taken. A series of such tests is done and a final general average made. Any rabbit giving a figure markedly out of line with the rest is rejected from the final calculation. The calculation for individual rabbits may be illustrated by the figures of rabbit No. 1 in the table attached.

$$\frac{0{\cdot}114 - 0{\cdot}053}{0{\cdot}114 - 0{\cdot}045} \times \frac{1{\cdot}6}{0{\cdot}075} \times 1{\cdot}5 = 25 \text{ units.}$$

McLeod and Orr, in testing on successive batches of rabbits, reject all tests in which there is a variation of more than 25 per cent. between extremes, and average the highest results which agree within this limit of variation for final assay. An example of an assay on the above lines but with only one short series is shown in table No. I.

TABLE No. I.

Rabbit.	Weight in grammes.	Initial blood sugar.	Equivalent of U 20 material injected.	Blood sugar at intervals after insulin.			Calculated unitage.	Remarks.
				1½ hrs.	3 hrs.	5 hrs.		
No. 1 ..	1600	·114	·075 c.c.	·040	·044	·090	26	
No. 2 ..	1700	·109	·075 c.c.	·036	·056	.100	24·8	
No. 3 ..	1500	·109	·075 c.c.	·048	·064	092	19·2	
No. 4 ..	1650	·111	·075 c.c.	·050	·060	·100	20	
No. 5 ..	1600	·111	·100 c.c.	·052	·066	·096	16	
No. 6 ..	1400	·104	·100 c.c.	·036	·020	·020	28	Convulsion from second hour onwards.
No. 7 ..	1350	·104	·100 c.c.	·044	·042	·020	23·6	Marked symptoms of hypoglycæmia.
No. 8 ..	1450	·109	·100 c.c.	·048	·056	048	26·5	
No. 9 ..	1500	·119	·125 c.c.	·040	·052	·084	14·6	
No. 10 ..	1550	·111	·125 c.c.	064	·060	·058	17·2	
No. 11 ..	1600	·100	·125 c.c.	·054	·076	·082	10	
No. 12 ..	1550	·090	·125 c.c.	·046	·060	·042	20	

Average unitage of batches (omitting No. 11)
22·5
23·5
17·3
Strength of tablets, 11 units.

Blood Sugar estimations by Folin's method.

The material used was insulin of American manufacture in tablet form, issued for experimental purposes only and marked 10 units per tablet, but sent with the manufacturers' note that the strength was approximately 12½ units.

In testing this insulin two tablets were dissolved in 1 c.c. of distilled water and the solution treated as U 20 material for the estimation of strength.

Rabbit No. 11 was omitted from the final calculation as giving an irregular figure, and the final result showed a unitage of approximately 11 per tablet. Variations occurred above and below this average and four rabbits out of eleven showed figures up to or above the manufacturers' estimate of 12½ per tablet. This series of tests was done with rabbits of mixed breeds and colours and without special selection. The tests show that satisfactory results can be obtained with Indian rabbits, and that, although variations occur in the response of individuals to insulin, the average result obtained is quite satisfactory for standardisation. These tests with really potent material will act as a check on previous tests carried out with material which was found to give results equivalent to from one-quarter to one half of the original potency and in regard to which the suggestion as to the unsuitability of Indian rabbits for testing insulin had left a doubt as to the correctness of the results obtained with such animals. The earliest specimens I tested showed a degree of inertness of which there could

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not have been any doubt, and I understand that it is now admitted that some of the early batches of insulin sent to India were prepared under conditions which were unsatisfactory.

That the method of preparation is important and that the putting up of insulin in tablet form is not a certain method of securing stability, is well shown by a recent test of insulin of Continental manufacture put up in this form, which, in doses up to the equivalent of 30 clinical units in a series of 17 rabbits produced only a fractional fall of blood sugar. In this case there must have been serious defect in the production of the original preparation.

Recent experiences with insulin in solution form have, in my hands, shown a general improvement in potency, but the best results obtained have varied from 9 to 12 units strength for material which was issued as 20 units.

Occasional samples in cold storage have shown full potency, but in regard to each material no extended tests were made.

There appears to be no reason why insulin of full potency should not be available in India, and in the case of the tablet form with the results which have been described. At least one firm is producing insulin which can be relied on. Clinical experience with this material, as compared with other samples of moderate strength, has confirmed the relative potency of the preparations.

Summary.

1. The details of a method used in the standardisation of insulin are described.

2. The results of tests of a sample of insulin in tablet form are given and show that with Indian rabbits a potency approximating to the manufacturers' estimate was obtained.

3. These tests show that although there is a variation in the response of Indian rabbits of mixed breeds, the average result obtained from a series of these rabbits can be relied on.

Postscript 22nd September, 1924.

Since forwarding the above paper for publication, I have obtained further samples of insulin for testing. Samples in solution form from two English manufacturers have been found to be of full original potency.

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A SUMMARY OF RECENT WORK ON LOBAR PNEUMONIA.

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1. *Introduction.*—In connection with the proposed use of vaccine treatment in the army in India this coming winter, it was thought it would be of interest to sum up our knowledge of pneumonia and particularly of immunity against the pneumococcus. I shall not attempt more than to mention briefly the most important facts and conclusions reached. There has been such a great deal of work done that it would be tedious to give every reference. Accordingly only single references will be given, and then only for the less known facts, although they may have been established by more than one worker; facts already well known will be mentioned without reference. This summary has been greatly facilitated by the recent reports of the Medical Research Council, of the Ministry of Health, and of the earlier report of the Rockefeller Institute referred to under (A), (B) and (C). These and other works quoted contain valuable lists of references. An alphabetical list of references will be given for all authors mentioned here. Unless otherwise qualified, pneumonia stands for *lobar* pneumonia throughout this paper.

2. *The Organism Responsible.*—(*a*) In about 95 per cent. of cases (apart from particular epidemics) the predominant infecting organism is the pneumococcus. Evidence—In from 90 to 95 per cent. of 1,500 cases (mainly in America) the pneumococcus has been isolated from sputum, blood, or lung—by puncture. Since sputum, which may contain organisms other than the predominant organism in the lungs, was used in most of these cases, and since the percentage of pneumococcal findings in positive lung punctures is 99 per cent. (Lister 1924) we may take 95 per cent. as a conservative estimate. Lung puncture has the small risk of hæmorrhage; air embolism, a more serious risk, is avoided if the needle be attached to a syringe and not used alone.—(A) q.v. for technique.

(*b*) Bacteriological diagnosis.

There is no reliable *single* criterion. Even bile-solubility is a matter of *degree*, and further some pathogenic as well as non-pathogenic pneumococci are not bile-soluble (Malone 1923 a). Bile-solubility in some strains was a *variable* character (A).

3. *Typing.*—(*a*) Standard antisera can be obtained from the Rockefeller Institute, New York. Differentiation is based mainly on *agglutination* with *mammalian* antisera in low dilutions,—final 1 in 40 for I and II, 1 in 10 for III (C). Precipitin reactions yield parallel results—except sometimes with the (American) subtypes of II (C), and may be done with (1) the peritoneal exudate of the sputum mouse; (2) the urine of the patient; (3) the bile extract of pneumococcal sputum,—Oliver's method. The last two are rapid "clinical" methods. For this and other technique see (A), (B) and (C).

(*b*) The modification of the American classification proposed by Griffith (B) seems to be the best. In this the fixed types are *single* types I, II and III, while *all others* are in *Group IV*. The Americans place some strains as subtypes of II on the strength of *agglutination by undiluted*

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serum. French results are often not comparable because another technique (that of Porges) is used, involving the chemical treatment of pneumococci. Type III is *Pneumococcus mucosus.* The is a different organism from *Streptococcus mucosus* (C) but text-books, e.g. Zinsser (1922 a) state the contrary.

4. *Distribution of types in cases.*—(*a*) On the whole the distribution in North America and in Europe seems to be the same, roughly I, 30 to 40 per cent.; II, 20 to 30 per cent.; III, 8 to 16 per cent. in America, but only 0 to 8 per cent. in *North Western* Europe; IV, about 30 per cent. A good summary is given in (A) but the largest individual result (Cecil and Larsen) of 834 cases is omitted. The commonest types in IV in England are the American II subtypes and Lister's A (A and Urquhart).

(*b*) The South African distribution (in *Africans*) is different (Lister 1917). I or C, 22 per cent.; II or B, 16 per cent.; III or E, 1 per cent.; IV or A, D, F, etc., 61 per cent. Here A which is in IV was the commonest (and most severe) type, forming 31 per cent. of the whole.

(*c*) Malone's (1923 b) findings in N. W. India—in Indians of various races and mostly from other parts of India, approximate to the African (or rural ?) type in the high percentage of IV, roughly I = 28 per cent.; II = 17 per cent.; III = 8 per cent.; IV = 47 per cent. One type in IV formed 12 per cent. of all types. No type in IV agglutinated with antisera to the commoner African IV types.

(*d*) More than one type is sometimes isolated—e.g. in 8 per cent. of cases (A). I and typical II have not been found together in cases (B)—nor in normal throats (Stillman 1917).

(*e*) *Remarks.*—We must bear in mind that differences in distribution may be associated not only with place, but also with time, and perhaps with race and class or *other environmental influences.* Thus rural communities may have a higher proportion of IV than that given above for American cities (Richardson). In a paper being published I show that Indian soldiers had a higher proportion of IV than Indian non-combatants (followers), and suggest that a high proportion of the fixed types is an index of defective hygiene, particularly in overcrowding; see sections 8 and 9. The possibility of errors in clinical diagnosis must also be remembered, for the IV group is much commoner in *broncho*-pneumonia. Lastly particular epidemics—perhaps associated with influenza—have their own types. Thus at Camp Logan 90 per cent. of cases (mainly lobar) were due to IV types (Hall and others).

5. *Severity of Types.*—Practically everywhere III is the most severe and IV the least,—but see paras. 4 (*b*) and 6. Individual strains of IV may be as virulent for mice and animals as I and II, but usually these fixed types—particularly I—are more virulent for mice than IV strains. The general level of mortality varies so much with countries and with circumstances that averages would be misleading. Mortality tables are given in (A).

6. *Broncho-Pneumonia.*—The percentage of cases due to the pneumococcus probably varies greatly; epidemics due to the streptococcus and to other organisms occur, as was the case in American army camps in 1918 and 1919. These were often associated with measles or influenza. One camp reported that the very great majority of cases were due to virulent pneumococci (Hirsch and McKinney). I have not seen adequate figures for endemic broncho-pneumonia,—but 22 out of 28 cases examined were pneumococcal (A). The percentage due to IV and the severity of IV, particularly in *children,* is greater than in lobar pneumonia (A).

7. *Distribution in Normal Throats.*—(*a*) The pneumococcus was isolated from the saliva of 43.5 per cent. of 485 normal people (A). The proportions of types were roughly, I = 2 per cent.; II = 4 per cent.; III = 16 per cent.; IV = 78 per cent. Whilst in non-contacts the proportion of I and II was less than 1 per cent., in contacts it rose to 25 per cent. (C). The figures are mainly from America. What the normal proportion of III is elsewhere remains to be determined. The remarks in 4 (*d*) also apply here. Thus in naso-pharyngeal swabs from 700 soldiers the pneumococcus was present in only 16 per cent. (Sailer and others quoted in (A)).

(*b*) In convalescents the predominant type in the sputum changes in about a month to one of the normal type—even if the infecting type is III, or in IV, a change usually takes place (C). This is more probably due to the overgrowth of a type previously present in small numbers (as found in some cases) during the attack of pneumonia, than to mutation of the predominant type (B).

8. *Type Specificity.*—(*a*) No change in type occurs on prolonged cultivation *in vitro* on ordinary media,—though loss of virulence occurs.

(*b*) Miss Stryker's work suggests that when grown in homologous serum what amounts to a change of type occurs, the degree and stability of the change varying directly with the time of growth. The "original" type characters reappear after one or more animal passages. This important work needs repeating with single cell cultures and with several types and sera before conclusions can be made.

(*c*) An apparent *mutation* of a IV strain to type I after animal passage is recorded in (A), and another "mutation" by Clough.

(*d*) *Agglutination.*—Monovalent fowl antiserum agglutinated pneumococci of all types but in different maximum dilutions (Kyes 1918), which tends to show that the difference in types by agglutination is one of degree. M. Clough reports that some strains are agglutinated by all three, I, II and III, antisera.

(*e*) *Protection of mice.*—Only homologous sera protect (C),—but either I, II or III sera served for Clough's strains.

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(*f*) *Curative action of serum.*—Only homologous sera are advocated, and in practice only I serum for I cases (C). A type-overlapping curative power is claimed for his monovalent sera by Truche, and for antibodies from serum by Cecil and Larsen.

(*g*) *Other reactions.*—(1) Pneumotoxin. The reaction to an intradermal injection of dissolved pneumococci after previous sensitization is not type specific (Kolmer and Steinfeld, Kolmer and Weiss).

(2) Similarly, antihæmolytic reactions of immune sera are not type specific.

(3) Complement fixation tests are not absolutely type specific.

The last two facts are quoted and the whole problem discussed by Cole and Moore.

(*h*) *Remarks.*—The subject is important both for treatment and for prevention. More evidence is required. We must remember that the specificity of immunity reactions is one thing, and the type fastness (or otherwise) of pneumococci is another.

9. *Infection.*—(*a*) The evidence of 7 (*a*) and (*b*) allows us to *presume* that direct or indirect infection occurs from cases.

(*b*) The dust of ordinary rooms and of rooms occupied by cases gave practically the same relative distribution of types as given by normal and contact throats respectively (C).

(*c*) I know of no evidence that many cases are due to direct infection from other cases—here and there groups of cases with a common source, often a healthy person, are described. The South African mine cases showed no evidence of the importance of direct cases to case infection (Maynard).

(*d*) In localized "epidemics" different types are often recovered from cases presumably infected from the same source (Zinsser, b). The same happened in experiments on monkeys (Cecil and Blake, b). This does not negative the importance of infection, but suggests the type mutability of pneumococci or (what is perhaps more probable) the *type multiplicity of infection.*

(*e*) It is commonly suggested that infection plays a greater part in I and II than it does in IV cases, where auto-infection perhaps occurs. The importance of healthy carriers of I and II is shown by Stillman (1917) and by (A). The carrier condition usually lasts about a month.

(*f*) There is good evidence, either for indirect infection from cases, or for what I may call "intensive crowd infection," in that local epidemics occur in conditions of crowding, particularly among recruits or labourers when newly brought together. For work on pneumococcus immunity and the suggestion of exaltation of virulence by the transference of organisms at the right stage see Bull, and for an experimental *in vitro* proof see Bloomfield and Felty, Felton and Dougherty.

(*g*) Pneumococci, mainly of Group IV, are more often found—in nearly twice as many instances—in individuals suffering from colds or influenza than in quite normal people, and such pneumococci are more virulent (Gordon).

(*h*) *Suggestions.*—Apart from the obvious hygienic measures indicated, it would seem sound to allot recruits more room than seasoned men. *Spittoons* in barracks might be useful. More windows or skylights in Frontier and Punjab barracks would probably be of use; the latter could be covered over with thick straw mats in the hot weather—pneumococci soon die on exposure to light.

10. *Pathology of the Onset.*—(*a*) Clinical evidence and the seasonal and regional incidence of pneumonia suggest that reflex vasomotor changes in the respiratory passages following chill assist in the production of attacks by producing favourable *local* conditions—it is unlikely that general immunity is so variable, but evidence is needed.

(*b*) A great deal of experimental work has been done (see Permar who gives a list), of which the most important is that of Cecil and Blake (1920 a) on monkeys,—the rabbit is too liable to septicæmia to furnish a good analogy for man. Summing up, we may conclude that:—

(1) Infection of the upper (supra-laryngeal) respiratory passages alone does not produce pneumonia. Unnatural organisms are quickly removed from these regions,—Bloomfield quoted by Stillman (1923).

(2) Intravenous or subcutaneous injection does not produce pneumonia.

(3) Infection of the lower respiratory passages even in minute doses (given in 1 c.c. of liquid) causes pneumonia. "Probably this infection must reach at least as low as the bronchi"—C, and B, above. It is more probable that to produce the disease the infection must always reach the lung alveoli, except when direct infection of the tracheal lymphatics is caused by the needle,—see Jones, and Stillman (1923).

(4) The start of pneumonia is the penetration of the bronchial or lung epithelium and infection of the *lymphatics.* This is followed by the infection of lymph glands near the root of the lung; from there as a focus an interstitial inflammation spreads outward into one or more lobes.

(*c*) Accordingly, in man the first important factor is *infection of the lower respiratory passages.* Clearly this can be direct by inhalation of the sputum spray of others, or indirect by *extension* from the pharynx, auto-infection. Para. 9 (*g*) is significant of the part catarrhs may play in both processes. Extension may be furthered by reflex vaso-motor changes which may assist also in the next process to be discussed.

(*d*) The second factor is *penetration* of the epithelium and mucous membrance. The fate of carbon particles suggests that in man the alveolar epithelium is readily penetrated—perhaps by the carrying action of leucocytes. General and local immunity processes (specific and non-specific) here play their part. Possibly *specific*

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local immunity is of importance—perhaps epithelial alone or perhaps of long tissue generally. Mice could not be infected with sprayed pneumococci that reached the lung, (Stillman 1923),—which suggests a natural local immunity.

11. *Pathology of the Course of the Disease.*—(*a*) 30 per cent. of blood cultures were positive (C). They are sometimes positive very early. They are usually negative at or soon after the crisis. A positive blood culture, particularly if late in the disease, is a bad sign. Contrary to text-books, pneumonia should be regarded as a *local* infection that is continually attempting to become general—and with success sometimes.

(*b*) A rising leucocytosis (polymorphonuclear) is a good sign.

(*c*) Recovering cases (before the crisis) show not only a diminution of cocci in the blood but also in the lung and sputum (Rosenow, quoted in A). Therefore we may not look upon pneumococci in the focus as shut off from the action of the body, though it is possible that within this area a large part of the final destruction of cocci is brought about by their own ferments and products, as suggested by Lord and Nye.

(*d*) At or soon after the crisis, certain type specific antibodies can be demonstrated in the serum of the majority of cases—except in type III infections, when they are rare. These are agglutinins, precipitins, opsonins, and "protectins"—to coin a word. The persistence of these is very variable,—from a few days to four months (Chickering 1914).

(*e*) The pneumotoxin reaction is given before the crisis and sometimes for a few days afterwards—see 8 (*g*).

(*f*) The first process of recovery is probably associated with immunity reactions leading to the destruction of living pneumococci in the blood, and to the removal or neutralization of their dissolved endotoxins;—the effective use of immune serum is followed by the abolition of bacteræmia (C).

12. *Acquired Immunity.*—(*a*) Second attacks are more frequent in those once attacked than are first attacks in those never attacked.

(*b*) Such attacks are more common in the earlier period after an attack than in the later (Maynard).

(*c*) This is against Lister's suggestion that such attacks are due to the disappearance of specific anti-bodies from the blood. It is also against exogenous infection by new types, but is in favour of infection by types already present—perhaps by a strain accompanying the predominant one. It suggests, either that infection of the lungs, or that individual susceptibility is of more weight in determining the onset of pneumonia than specific immunity reactions are in preventing it.

(*d*) The evidence in 11 (*d*) on serum anti-bodies suggests that type-specific acquired immunity is short, but these substances do not represent the whole action of immunity—see later.

13. *Active Immunity in Man.*—(*a*) From the discussion on Lister's prophylactic work (1924), I conclude that no striking benefit in the diminution of total incidence has been proved; further, this is the opinion of some competent local observers. I suggest that the addition of the results for 1917 to the last table in the discussion would clarify matters. Lister notes the very great diminution—abolition in one mine—of A, B and C cases following the use of A B C vaccine, and advances it as proof of success. This argument, based on a redistribution of types, may not be used as proof of benefit. As a controlled result it can be used as a proof of the action of vaccine plus either type mutability or type multiplicity of infection. It certainly *suggests benefit,* so that possibly all that was wanted was better controls. Here I must protest against Lister's idea, that, because vaccination may be of indirect benefit to the unvaccinated by diminishing the total infective conditions, therefore the use of the alternate individual method is vitiated. This is not so, for a good control is obtained for *the same infective conditions;* whether these as a whole are changed by the vaccine may be deduced from a comparison with a second absolutely unvaccinated control. Maynard's statistical analysis of Wright's results on the Rand leads him to conclude that vaccination has a protective effect, but for not more than about 4 months,—its protective value is greatest shortly after inoculation and progressively diminishes.

(*b*) The American results at Camp Upton (Cecil and Austin) were good—no cases of I, II and III (the vaccine types) occurred and the incidence of IV and of streptococcus cases was less than in the unvaccinated. More information is required as to *how* the statistics were obtained, though these are perhaps accurate since the period of observation was only 10 weeks. The controls unfortunately were regimental *units.* On the whole—though not conclusive—these results are very suggestive of benefit for a short time. The controlled results at another camp (Cecil and Vaughan), though not so good and though complicated by influenza, were good on the whole,—the results in seasoned men seemed better than in recruits.

(*c*) Specific anti-bodies are demonstrable in the serum of the vaccinated—these occur later if a lipovaccine be used than with the ordinary saline suspensions (Whitmore, quoted by Cecil and Vaughan). Lister states that, contrary to natural acquired immunity, these anti-bodies sometimes persist for as long as 8 months.

(*d*) I conclude that the results so far are no more than very suggestive of a good effect,

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particularly over *short periods,* of prophylactic inoculation, and that conclusive evidence of benefit, over say 6 months, has not yet been obtained.

14. *Active Immunity,—Experimental.*—A great deal of work has been done; as before, that on monkeys by Cecil and Blake 1920 (*b*), and by Cecil and Steffen 1921, 1922, 1923, is most valuable.

(*a*) After subcutaneous vaccination type-specific anti-bodies as mentioned are demonstrable in the serum—but seldom against III. The intravenous route requires smaller doses than the subcutaneous.

(*b*) Protective power for mice does not always correspond with the presence of agglutinins and opsonins—a serum might protect and not agglutinate and vice versa (C).

(*c*) Such antisera are not distinctly bactericidal or anti-blastic (Barber).

(*d*) Subcutaneous and intravenous vaccination produce active immunity against infection by the lungs or by other routes, except with III and some strains of IV when immunity is often not produced (Cecil and Blake and Cecil and Steffen above).

(*e*) Such immunity is not necessarily associated with the presence of the anti-bodies mentioned. The converse also holds, that serum can be protective and yet the animal be not immune.

(*f*) The *duration* of this immunity so far as I know has not yet been determined.

(*g*) A variable degree of immunity to *other types* is also produced.

(*h*) Such immunity is more readily produced (in monkeys) against infection by the intravenous route than against intratracheal infection; the importance of local cellular immunity is suggested by Cecil and Blake.

(*i*) *Intratracheal vaccine* produces immunity to infection—by the intratracheal route, and this in most cases without any specific protective power of the serum, which suggests cellular immunity. (Cecil and Steffen 1922). It remains to be determined whether immunity can be so produced to infection by other routes.

(*j*) Specific whole blood immunity is produced almost as well by intratracheal as by intravenous vaccination, and better than by the subcutaneous route (Smiley and quotations). This is a "bactericidal" action which includes the action of leucocytes. This whole blood bactericidal action is mainly type-specific, but some destruction of other types occurs; it appears before agglutinins appear (Heist and Solis-Cohen 1919).

15. *Natural Immunity.*—(*a*) Some normal human sera protect mice without agglutinins, etc., being demonstrable (P. Clough).

(*b*) The blood of Europeans had more phagocytic power for pneumococci than that of tropical Africans, further Europeans responded better to immunization (Wright 1914).

(*c*) Whereas phagocytic mixtures of serum plus leucocytes and of defibrinated or decalcified blood plus leucocytes leave all the ingested pneumococci alive, *whole blood phagocytosis* is accompanied by the death of large numbers of pneumococci (Wright 1912).

(*d*) Similarly Heist and Solis-Cohen (1918) report that the difference between the bactericidal action of the blood (including leucocytes) of susceptible and resistant animals could not be demonstrated if the blood were first defibrinated. But with a special technique Robertson and Sia show that the leucocytes plus serum of resistant animals (dog or cat) kill pneumococci, whereas those of susceptible animals (rabbit, etc.) do not. This bactericidal action does not occur if the serum be previously inactivated.

(*e*) Normal horse serum (as well as immune) inhibits the growth of pneumococci, (Barber).

(*f*) The immunity of pigeons is mainly due to phagocytosis in the spleen and liver and not to serum reactions. (Kyes, 1916).

(*g*) But the serum of fowls protects mice to a moderate extent (Bull and McKee, quoted by Robertson and Sia).

16. *Passive Immunity.*—(*a*) Some evidence has been given in 8 (*f*). For summaries of data on the effect of treatment of I cases by I horse antiserum see (A) and Langley. I think we can take it as well established that a tested *reliable serum,* started *early* and given in large (100 c.c.) repeated doses is efficacious,—its use is of course not contra-indicated in late cases. *Some sera on the market are useless* (A).

(*b*) Cecil and Larsen tried serum anti-body (against I, II and III) in 424 cases with controls. The results were good in I cases, less so in II and IV (so some cross protection). No effect was produced against III.

(*c*) The reported results of Kye's polyvalent fowl antiserum in repeated small doses (10 c.c.) are good—summarized in (B). Continued use has confirmed this (Capps).

(*d*) Human convalescent homologous serum has been used with reported good results.

(*e*) Berger and Montgomery have reported benefit from intramuscular injections of chicken blood.

17. *Remarks on Immunity.*—More evidence is needed and will probably soon be forthcoming, but meanwhile it is perhaps permissible to indulge in a little speculation.

(*a*) It is evident that in *whole* blood we have immunity reactions which differ, either in kind or degree, from those of serum alone, and possibly even from those of serum and leucocytes.

(*b*) The absence of strict parallelism between the protective power of serum, and the presence of agglutinins and opsonins on the one hand, and immunity on the other, suggests that blood plasma contains a very labile specific or non-specific substance, which may act directly on pneumococci as well as more energetically in combination with

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specific known anti-bodies. The double nature of many enzymes offers an analogy. Hektoen and Ruediger claimed that opsonins have a labile component (Zinsser c). Possibly such a substance is produced by leucocytes—for evidence of their extra-cellular action see Tongs, also Wright (1923) on epiphylactic response. Possibly leucocytes (or other cells) on receiving an appropriate stimulus have the power to specifically modify their normal secretions. Local cellular or tissue specific immunity is at present a "fashionable" probability, but there is no reason to exclude the *cells of the blood* from this idea.

(*c*) Whether clotting plays an important part (other than mechanical) in immunity against pneumococci still needs to be determined;—important substances may be retained in the clot.

(*d*) The evidence under 14 (1) shows the need for caution in postulating tissue immunity, because we may possibly be dealing instead with unknown factors in whole blood immunity.

(*e*) The testing of whole blood immunity appears to be one of the most important tests of active immunity, and promises to become a standard test for vaccines. I suggest that similarly it be used to test the efficacy of antisera, by finding the degree of enhancement of the bactericidal power of whole human blood caused by the addition to it of measured quantities of a serum.

18. *Vaccine Treatment.*—The late vaccine treatment of complications is too well recognised to need comment. *Early* treatment with vaccine has been well reported on by many observers chief among whom are:—

(*a*) Wright and others (1914). Vaccination in the incubation period appeared to abort an attack. A negative phase did not supervene with single doses of less than 1,000 million cocci.

(*b*) Raw (1912) reported benefit, particularly in the absence of complications. Dose from 100—150 million.

(*c*) Wynn (1915) reported good results from *early* treatment. Several attacks were aborted, although consolidation, etc., took its normal course. Stock untyped vaccine, virulence essential, primary or early cultures best.

(*d*) Wynn (1922). As above good results in both lobar and broncho-pneumonia were obtained by early treatment with polytype vaccine of virulent strains—49 lobar cases treated within the first 3 days with only 1 death, and that in a labour case. The virulence of the strains used is said to be more important than typing. Dosage 100 million, repeated if necessary on each of the next few days. Once a 1,000 million given with good results.

(*e*) Malone's recent good controlled results (1924) were with homologous rabbit-grown vaccine, following a stock vaccine on the first day of treatment—18 treated within the first 3 days with 1 death, 17 untreated with 5 deaths. Dose 400 million each on three successive days. No general reaction to speak of.

(*f*) Lister (1924) reports good results from South Africa, and quotes good results by Girdwood. Dose recommended, 8,000 million cocci repeated once after 24 hours. Lister states he has given as much as 20,000 million intravenously to cases and apparently with benefit, despite the provoking of rigors.

(*g*) In dogs with a pneumococcal septicæmia the organisms diminished in numbers shortly after a living vaccine (Bull).

(*h*) Altered vaccines. Some workers—e.g., Rosenow and Falls—have reported benefit. Their use is usually accompanied by distinct general reactions which possibly may be due only to the large doses employed. It is to be noted that many users of ordinary vaccines in small or moderate doses have reported benefit—an early detoxication, without any particular rise of temperature, etc.

(*i*) *Foreign proteins.*—Many have reported benefit from the use of typhoid vaccines, injections of milk, etc. As typical examples we may take (1) Miller who found that in 6 out of 15 cases detoxication occurred after an intravenous injection of 30 million dead typhoid bacilli. The initial general reaction bore no relation to the benefit received. (2) The action of nuclein injections in producing leucocytosis has recently been favourably reported on in pneumonia by Gardner Medwin. Large doses of sodium bicarbonate are said to have assisted.

19. *Remarks and Suggestions on Vaccine Treatment.*—(*a*) Lack of controls with fewness of cases make sound conclusions impossible. Assuming that vaccines and non-specific proteins have been of some use, it would appear that the action of a vaccine in early treatment is probably at least partially non-specific—the immediateness of the response is against specificity except that some sensitisation may have already occurred. Wright's epiphylactic response (of leucocytes) appears to be mainly non-specific. In our present ignorance is is best to use specific vaccines, and for the same reason type-specific if possible.

(*b*) Immuno-transfusion seems indicated in cases not benefited at once by vaccines.

(*c*) Autohæmotherapy has not yet been sufficiently tried.

(*d*) *Dosage.*—Remembering the clinical picture of pneumonia, and seeing that moderate or severe general reactions following the injection of foreign proteins—including vaccines and specific antisera, are said to have sometimes had a bad effect,—e.g., by Cecil and Larsen, I think it would be sound to lay down for the present that the treatment vaccine dose should be *sub-reactional.* Further, it should be the dose that yields the best response. This is impossible to decide without experiment and observation. The tendency in South Africa is towards two doses, or even only one early *large* dose. While I think it probable that two doses (with 24 hours between) each of 400 or 500 million pneumococci given subcutaneously will be found to be as effective as

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larger doses, and to be free from general reactions, yet since individual idiosyncrasies occur, perhaps smaller doses of 200 or 300 million each would be advisable to begin with until experience with large numbers of cases is gained. I think only two doses would be best. Too small a dose may produce no results at all.

(*c*) The importance of *early* treatment cannot be too strongly emphasised. Signs of consolidation should not be waited for. No harm will be done if a few be treated for pneumonia when they do not have it, whereas late diagnosis and treatment will vitiate the trial of vaccines. When cases report or are diagnosed after the third day of illness, vaccine should not be given,—these late cases should be recorded separately. Wynn's last article should be read by all using vaccines.

20. *Other Treatment.*—(*a*) The necessity of not overfeeding and of using *glucose* to replace food by the mouth—given by other routes if necessary, has been emphasised by several. Burkitt reports that 255 cases of mixed pneumonias seen *early* have been treated without a death on his lines of initial purgation (plus bleeding if indicated), starvation except for glucose, hydrotherapy to keep the temperature below 101°F., alkalies plus much water. Crossman reports benefit from large repeated doses of tincture of garlic—half a drachm every 4 hours or so.

(*b*) *Quinine* and cinchona derivatives have a direct bactericidal action on pneumococci, but there is no good evidence that quinine in large doses is of use in pneumonia—my own clinical impression has been that cases treated by mistake as malaria in the first day or two with full doses of quinine did badly. Quinine in high dilutions stimulates phagocytosis, but not in low dilutions when it poisons leucocytes. (Kolmer, Solis-Cohen and Steinfeld). Ethyl hydrocuprein (optochin) after trial in 75 cases is not recommended for the routine treatment of lobar pneumonia by Moore and Chesney. It follows that quinine is not indicated. I suggest that if given to *prevent malarial* relapses it should be very cautiously used, if at all, *before the crisis*—e.g., only in small doses in the first two or three days. After the crisis is another matter.

21. *The Preparation of Stock Vaccine.*—(*a*) Types. I suggest that these should be I, II and III plus the commonest IV type. Their relative proportions should be roughly according to the local distribution prevalent, e.g., for North India I suggest 2 parts of I to 1 of each of II, III and of the commonest type of IV as found by Malone.

(*b*) Virulence. This is still a debated question. So far as the pneumococcus is concerned, most observers favour virulence in strains for the production of good *antisera*, e.g., Griffith in (B). This does not necessitate virulence for active immunity or for treatment—see Cole and Moore (B), though even here it has been insisted on—Wynn and others, but how much merely as an opinion, and how much as the result of experiments is not recorded. Harvey and Iyengar's work suggests that generally virulence is not needed for producing active immunity. Cole and Moore point out that it is *virulence for man* that is wanted, so keeping stock cultures going on *human* blood or serum media with occasional animal passage might be of use, if there be any advantage in incorporating only virulent strains : for the maintenance of virulence see Gaskell.

(*c*) Constitution. Ferry and Fisher have recently shown the antigenic importance of the filtrates of broth cultures and of the washings of pneumococci grown on solid media. Until more is known of antigens and immunity, it is probably best to use a whole unwashed vaccine made from organisms grown on solid media—to avoid the toxicity of the ordinary constituents of liquid media.

(*d*) Media. Recent work by Avery, Morgan and Neill (1924) has shown that multiplication of pneumococci ceases from production of acid and of peroxides (probably H_2O_2) and that the latter can be prevented by anærobic growth or by the addition of fresh unheated animal or plant tissues—potato serves well. So the addition of sterile potato or other juice to suitable solid media—e.g., trypsinated meat agar, can replace the addition of blood or serum. The optimum P_H is one of 8.

(*e*) The suspension liquid. Recent work by Robertson and Woo, Sia and Oswald (D. 1924) has demonstrated that lysis is slower in Locke's fluid or in phosphate solutions than in normal salt solutions, and is slowest if 0.1 per cent. gelatin be added. Lord and Nye have shown that the lysis of pneumococci and even solution in bile are due to enzymes. To what extent autolysis alters *important antigens* is a problem demanding attention. Possibly the reported superiority of autogenous vaccines in many instances is due to their being *fresher* and less autolysed than stock vaccines.

(*f*) Sterilization. Evidence is needed for the relative advantages of killing by heat and by antiseptics, and of various antiseptics such as formalin, phenol, etc., as preservatives for vaccines—the histological properties of formalin would seem to indicate its trial for vaccines. The prevention of autolysis should perhaps be one of the properties of a preservative.

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ON THE LIFE HISTORY OF *HERPETOMONAS MUSCÆ DOMESTICÆ.*

*A Preliminary Note.**

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MAHOMED HUSSAIN, M.B.

THE writer has been studying for upwards of a year the herpetomonad found in the common house fly, and has found its life cycle to be so widely different from that described by Patton and others that he considers it advisable to publish this short preliminary note on the findings. The fuller description of the life cycle of this parasite, together with a detailed account of the experiments carried out and observations made, is reserved for future publication at a later stage. In all some 7,000 flies have been examined, some 50 per cent. of whom proved to be infected.

The observations on which this note is based were made throughout on living preparations from flies in citrated saline solution and were confirmed by a large number of stained specimens showing the various stages of the life history.

The facts established are briefly as follows:—

(1) Herpetomonas is a tissue parasite, not an intestinal parasite.

(2) The flagellate stage is an ephemeral one, lasting for a period of not more than 6 hours, and often less.

(3) The function of the flagellate stage is one of sexual reproduction.

(4) The parasite, after entering the fly's intestine in its infective "spore stage," penetrates the intestinal wall in the upper part of the intestine, and reaches the loose areolar tissue under the lining membrane of the intestine, in which it divides by fission, multiplies, and grows to maturity.

(5) The process of growth in the tissue usually occupies three days, at the end of which period the mature flagellate bores its way back to the lumen of the gut.

(6) On emerging into the lumen of the gut a process of sexual conjugation takes place almost at once and cannot usually be observed after a lapse of 15 minutes after the migration of the parasite.

(7) After one to two hours during which the macronucleus divides and gives origin to a number of minute spherical spores, a process of "spore extrusion" takes place which lasts for about ten minutes during which time the flagellate is contorted by recurring convulsive movements, each of which culminates in the extrusion of a minute spherical spore, which is a highly refractile body exhibiting contractile

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movements, and which stains a dark blue with Leishman's or Giemsa's stain, so that it resembles a coccus in stained specimens. These stained specimens still, however, retain their highly refractile appearance if the condenser be lowered, which differentiates them from any variety of coccus.

(8) These spores are present in enormous numbers in the lower gut of infected flies, and I have also observed them in N.N.N. cultures from kala-azar cases. These spores undoubtedly constitute the infective stage of the parasite and are resistant to a hostile environment and capable of withstanding exposure. The flagellates themselves have almost all disappeared before reaching the lower gut, and those that remain are almost all degenerate or dead.

(9) The stages of development of Herpetomonas may be summarised as follows:—

(1)	Minute spores	.. the infective stage.
(2)	Larger spores	.. the penetrating stage.
(3)	Binucleate bodies	.. in the tissues.
(4)	Torpedo shaped bodies	in the tissues.
(5)	Preflagellate bodies of various sizes	.. in the tissues.
(6)	Immature flagellates with developing flagella	.. in the tissues.
(7)	Mature flagellates	.. which migrate into the intestine to complete their sexual life history.

(10) I have observed all these stages in the four varieties of Herpetomonas so far found in flies and also in cultures of kala-azar parasites. In N.N.N. cultures from kala-azar cases the flagellates and the spores are found in the water of condensation at the bottom of the tubes. I found all the other stages in the substance of the solid medium which takes the place of the tissues in Nature. A core of medium, removed in a sterile glass pipette and made into a film and stained shows all the stages, if only the culture is not too recent. After 6 or preferably 9 days there is no difficulty in finding the parasite in various stages of development.

I have only to add that in the whole course of these observations I have never observed fission of flagellates, though I have several times been almost misled by what looked like fission. I have however observed two phenomena which closely resembled fission. In sexual conjugation which takes place on the horizontal plane, the two flagellates are easily seen side by side, but in sexual conjugation taking place in the vertical plane one flagellate is superimposed over the other and at first only the two lashing tails are seen. Later, as the flagellates separate, two bodies appear. It is probable that this has been interpreted as fission of flagellates with the fission commencing in the flagellum. Conjugation in intermediate planes also gives various appearances resembling fission, depending upon the axis in which the phenomenon is observed, but these appearances are mere optical illusions. The other phenomenon is a pure optical illusion which occurs when a flagellate is actively moving in an axis which is tilted at a certain angle to the vertical axis of observation. The threshing flagellum has refractile properties differing from those of the body, and what appears to be a single flagellate in motion suddenly appears to have a line of division along its length, and may even give the appearance of a flagellate splitting off. If, however, attention is fixed upon one such flagellate alone, it will be found that as the axis changes, the illusion disappears, and what looked like a pair of flagellate bodies again resolves into a single flagellate. I have never seen the actual production of a second flagellate by fission, and I have always noticed that in this phenomenon there are never two tails, and there is only the temporary appearance of two bodies, and in the phenomenon of superimposed conjugation there are always two tails and two bodies all the time.

It is, of course, obvious that if my observations are correct, the division of flagellates by fission is not necessary and is most improbable.

[*Note.*—The above article by Lieut.-Colonel W. C. Ross is somewhat revolutionary in its views on the life-history of Herpetomonas. Lieut-Colonel Ross has spent many months in a study of the subject, and is convinced of the accuracy of his views. We do not subscribe to his opinions, but publish his article with pleasure. We should be the first to congratulate Lieut.-Colonel Ross if his work should help in solving the problem of the transmission of kala-azar.—EDITOR, *I.M.G.*]

A Mirror of Hospital Practice.

A CASE OF COMPLETE TRANSPOSISION OF THE VISCERA.

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A HINDU BOY, B. R., aged 8 years, attended the Out-patient Department of the Medical College Hospital for treatment for kala-azar. Palpation of the abdomen revealed a tumour in the right hypochondriac region extending downwards and inwards to about the level of the umbilicus. This tumour had a splenic outline and there was a distinct notch in its anterior margin. The liver was felt in the left hypochondrium and was slightly enlarged. The boy was admitted into hospital on the 16th August 1924. X-Ray examination showed the heart on the right side of the chest. Skiagrams of the abdomen taken after a bismuth meal showed that the stomach was mainly situated on the right side of the abdomen with its cardiac end under the right cupola of the diaphragm and the duodenal bulb on the left side of the middle line.

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The cæcum and the ascending colon were found on the left side. The descending and the sigmoid colon were situated on the right side of the adbomen.

Cases of complete transposition of viscera are not so very common, hence my excuse for recording the above.

NOTES ON SOME CASES OF RELAPSING FEVER.

By K. V. RAJU, L.S.M.F.,

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THE following cases of relapsing fever were admitted to this hospital during a local epidemic in August to October 1923. Some of them might have been mistaken for plague, had not the diagnosis been confirmed in each instance by the finding of spirochætes in blood films:—

Case 1, *aet.* 27.—Admitted to hospital for continuous fever for 6 days, slight cough and pain in the back and all over the body. Temperature on admission 102.8°; conjunctivæ tinged yellow; had a "staggering" gait. Blood examinations revealed many spirochætes. Temperature came down by crisis 12 hours after. An intravenous injection of 0.45 gm. N.A.B. was given on the 4th day and the patient discharged on the 15th day.

Case 2, *aet.* 24.—Admitted to hospital for very severe headache, pains in joints and fever for the past one week. Eyes yellowish. Temperature 104°F. Intravenous injection of 0.45 gm. N.A.B. given. Morphine had to be given for pains in the joints. Temperature went down below normal 36 hours after the N.A.B. injection. Discharged at his request on 11th day. He was re-admitted 21 days after with a temperature of 104°F., and with similar symptoms, of 3 days' duration. (He had an apyrexial interval of 27 days, according to his own statement.) N.A.B. 0.45 was given intravenously. Temperature came down to normal 24 hours after. He had 8 motions after the N.A.B. (? reaction). He complained of severe headache, pains in elbows, head and back for 5 days. Potass. iodide and bromide and sod. salicylate had no effect on his pains. Phenacetin relieved his headache. Discharged on the 13th day.

Case 3, *aet.* 40.—Complained of fever and headache for the past 7 days. Temperature on admission 99.4°, but he looked extremely ill. No spirochætes were found in his blood. Discharged on 7th day. Came for re-admission 3 days after, with a temperature of 104°F. and spirochætes in the blood—duration 2 days (*apyrexial* interval 8 days). 0.45 gm. N.A.B. given intravenously. Temperature normal in 24 hours. Temperature showed a tendency to go up on the 12th day and another injection of N.A.B. 0.45 gm. was given on 15th day. This cured him and he was discharged on the 24th day. He had very severe pain in both legs and was unable to move.

Case 4, *aet.* 30.—Suffered from "cold and fever" for the past 15 days. He had hiccough of 2 days' duration; persistent and about 30 times per minute on the average. Conjunctivæ tinged yellow. Temperature on admission 97°F. Patient very thin, emaciated and weak. Temperature on 5th day 101°F.: very few spirochætes found in blood: on 8th day, temperature 103.5°F. again spirochætes were found. Temperature below normal on 9th and he died on 10th morning. He had muttering delirium almost practically the whole period. No specific treatment was given to this man, as he was very bad otherwise, and, if he died in spite of an intravenous injection of N.A.B., this specific treatment would become unpopular amongst the illiterate coolies, at the very beginning of the epidemic. In Manson's "Tropical Diseases," 7th edition, page 184, it is said "of the salvarsan compounds Novarsenobillon is the best....evidence shows that the compound is most efficacious when given in the pre-critical stage, i.e., when the temperature is on the rise....Relapses are apt to occur if it is given while the temperature is on the fall, or during the apyretic period.....Salvarsan ought not to be given immediately before the crisis: a very grave reaction due to the great destruction of the spirochætes and the liberation of their toxins, with corresponding aggravation of the symptoms and, it may be, fatal collapse, is apt to ensue...." All these kept me back from giving him an intravenous injection, and he died. A few days after, I saw a case of relapsing fever in a woman with as many as 27 spirochætes (on the average about 20) per field, and the day I saw her was her 5th day of fever. I decided to give her an intravenous injection, and, 0.45 gm. of Neosalvarsan was given to her. I heard that she died of "collapse" about 28 hours after. It would be very useful indeed if some of the readers of the *Gazette* would give me some idea of the contra-indications to the specific injections in cases of relapsing fever.

Case 5, *aet.* 34.—Fever for 6 days. Had slight muttering delirium also. Temperature on admission 102°F. Had also hiccough now and then. Neosalvarsan 0.45 gm. was given intravenously. Temperature came down to below normal 12 hours after. Discharged on 15th day. Both cases 4 and 5 were working as coolies in the gas shed and both had hiccough and a certain amount of muttering delirium and both were admitted at an interval of 3 days. Has their occupation anything to do with the hiccough, etc.?

Case 6, *aet.* 50.—Fever for one week and cough. Temperature 101°F. N.A.B. 0.6 gm given intravenously. Temperature below normal in 12 hours. Had griping pain in the abdomen for two days, (? reaction to N.A.B.) Discharged 13th day.

Case 7, *aet.* 30.—"Cold, fever, cough" for the last 5 days. Temperature 103.6°. N.A.B. 0.45 gm. given. Temperature below normal 24 hours after. Discharged 16th day.

Case 8, *aet.* 30.—"Cold and fever" for 1 day. Temperature 104°F. N.A.B. 0.45 given. Temperature below normal 60 hours after. Severe headache and pains in the legs. Discharged on 18th day; re-admitted on 20th day, i.e., 16 days after the temperature went down, with temperature 103°F. and spirochætes in blood. N.A.B. 0.45 gm. given intravenously. Temperature below normal 36 hours after. Discharged 34th day.

Case 9, *aet.* 36.—"Fever and cold" for 3 days. Spleen enlarged; 105.4°F. on admission. N.A.B. 0.45 gm. given. Temperature below normal 36 hours after. Had much pain in shoulder, back, etc. Discharged 14th day; re-admitted 16th day, i.e., 13 days after temperature came down to normal, with a temperature of 103.4° and spirochætes in blood. N.A.B. 0.45 given intravenously. Complained of "running-of-ants" sensation in legs and hip and very severe pain. Discharged 28th day.

Case 10, *aet.* 40.—"Fever, cough and pain in the chest" for 2 days. Temperature 103.2°F. N.A.B. 0.6 gm. given intravenously. Temperature below normal 36 hours after. Discharged 13th day. His child, *aet.* 4 had spirochætes in the blood with fever, etc.

Case 11, *aet.* 29.—"Fever, pain in head and back and cough" for 3 days. Temperature 103°F. N.A.B. 0.6 gm. intravenously. Temperature below normal 36 hours after. Discharged 11th day.

Case 12, *aet.* 20.—Fever 3 days. Temperature 103°F. N.A.B. 0.45 gm. Temperature down to normal 36 hours after. Discharged 10th day.

Case 13, *aet.* 38.—Fever for 4 days. Temperature 103°F. N.A.B. 0.45 gm. given. Temperature 36 hours after, below normal. Discharged 12th day.

Case 14, *aet.* 34.—"Headache and fever" 2 days. On admission temperature 104°F. N.A.B. 0.45 gm. 36 hours after temperature down to normal. Discharged 11th day.

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Case 15, *aet.* 19.—Was inoculated against plague 3 weeks ago. "Fever" from the last 3 days; cough; conjunctivæ yellowish; spleen slightly enlarged; temperature 102°F. N.A.B. 0.45 gm. given. Temperature down to normal after 36 hours; 24 hours after, 103°F.; to normal after 48 hours; then evening temperature 100°F. and morning 98°F., for 2 days, then normal, discharged 13th day. Complained of much pain in back, head and joints while in hospital. Re-admitted 5 days after, i.e., 11th day after the temperature went down to normal, with temperature 104.6, and spirochætes in blood, and of 2 days' duration, N.A.B. 0.45 gm. intravenously. Temperature normal 24 hours after. Discharged 14th day. The temperature chart was as shewn.

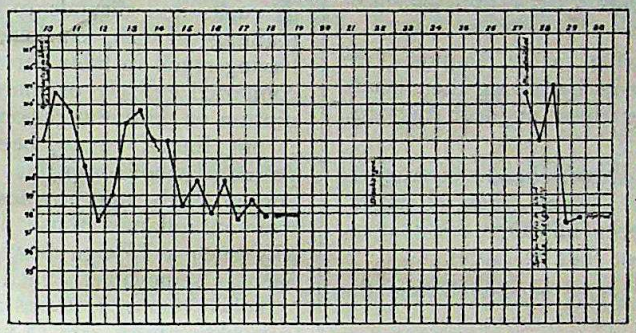
Case 16, *aet.* 35.—Cough, headache, fever 3 days. Temperature 103.6. N.A.B. 0.45 gm. Temperature down within 36 hours. Left hospital 7th day of his own accord.

Case 24, *aet.* 43.—Fever, duration 8 days. Temperature 98.4. No spirochætes in blood. On 2nd day N.A.B. 0.45 gm. given. Blood examined daily till 12th day. No fever, no spirochætes, complained of pain in knee, ankle and back. Discharged 12th day.

Case 25, *aet.* 18.—Fever, duration 8 days, with pains all over. Temperature 98.4°F. on admission. No spirochætes. On 2nd day N.A.B. 0.45 gm. was given. Temperature 3rd day, 102.6°; varied between 101° and 99° with pains in abdomen, spleen, both legs, etc. Temperature normal on 10th day. Discharged 12th day. No spirochæte in blood throughout (? first relapse). Vomited 2 Ascaris (? reaction to N.A.B.).

Case 26, *aet.* 18.—Fever, duration 3 days. Eyes yellowish, clenched his teeth often. Respiration 40, pulse 120. Had cough, complains of pain in chest. Temperature 103.8. N.A.B. 0.45 gm. intravenously. Temperature normal 24 hours after. Discharged 13th day.

Case No. 15.



Case 17, *aet.* 37.—Fever 2 days; temperature 103°F. N.A.B. 0.45 gm. intravenously. Temperature down to below normal 36 hours after. Discharged 6th day, at his own request.

Case 18, *aet.* 38.—Fever, headache and pains in joints of three days' duration. Temperature 102°F. N.A.B. 0.45 gm. Temperature normal in 24 hours. Vomited 2 Ascaris. Discharged 16th day. Twenty-one days later this man was admitted to hospital, for amœbic dysentery, with *E. histolytica* seen under the microscope. Had 5 emetine hydrochloride injections and developed a temperature of 103°F. on the 11th day of admission. No spirochætes were found in the blood; anyhow another N.A.B. injection of 0.45 gm. was given and he was discharged on the 17th day.

Case 19, *aet.* 36.—Fever, duration 2 days, with pain in back and all over joints, eyes yellowish. Temperature 103.2. N.A.B. 0.6 gm. given. Pain in the joints and bones very severe. Morphia had to be given. Temperature down to normal 36 hours after. Another dose of N.A.B. 0.45 gm. was given on 11th day. Discharged 15th day.

Case 20, *aet.* 39.—Fever and cough 3 days; eyes yellowish; temperature 102°F. 0.45 gm. N.A.B. given intravenously. Temperature down to normal in 36 hours. Began to rise to 99° and 100°F. from 5th day onwards. On 14th day, N.A.B. 0.45 gm. intravenously. Complained of much pain on back, nape of neck and shoulders.

Case 21, *aet.* 37.—Fever 2 days. Pain in back and all joints and headache. Temperature 103.2°. N.A.B. 0.45 gm. given. Normal in 36 hours. Discharged 12th day.

Case 22, *aet.* 35.—Pain and fever 3 days. Temperature 103.8. N.A.B. 0.45 gm. given. Temperature normal 12 hours after. Complained of severe pain in legs. Discharged 6th day at his own request.

Case 23, *aet.* 30.—Fever, cough, pains in joints of 2 days' duration. Temperature 102.4°F. N.A.B. 0.45. Normal 36 hours after. Complain of pain in knee. Discharged 12th day.

Case 27, *aet.* 34.—Pain, headache, cough of 3 days' duration. Temperature 103.2°. N.A.B. 0.45 gm. given. Aches very severe. Temperature normal 24 hours after. Pain in metacarpal and interphalangeal joints, (gave a history of syphilis). Right eye congested. Two days later the left foot became swollen, tender and fluctuating. Opened under chloroform, when there was a free discharge of offensive pus. Discharged 26th day.

Case 28, *aet.* 35.—Eyes yellowish. Abdomen distended; spleen enlarged; cough. Temperature 105.6°. N.A.B. 0.45 gm. Normal in 24 hours. Pains in hip, knee and back. On 11th day, temperature 100.6°F., with pains on left side of chest and shoulder. N.A.B. 0.45 gm. given on 13th day. Pains much better. Had epistaxis after the injection. (? re-action.) Discharged 19th day.

Case 29, *aet.* 28.—Headache, fever, and pain in back—6 days' duration. Temperature 103°F.; spirochætes in blood. N.A.B. 0.45 gm. given. The same evening temperature 106°F.; hot packs applied; had muttering delirium for 2 days, soon after the temperature came down to normal, 12 hours after. Discharged 9th day.

General remarks.

(1) All the patients complained of pains in the back, legs and all over the body.

(2) The disease attacks mostly male adults of the poor and dirty working class, who live in a small room with their wives and children.

(3) High fever, yellowish conjunctivæ, a history of pains in the back especially, and all over the bones and joints generally, with a sort of "giddy, staggering walk" is almost suggestive of relapsing fever, in dark-skinned dirty coolies, who have a luxuriant growth of hair on their head. Most of these patients had also cough.

(4) I have seen a few cases amongst women also: e.g., the wife of case 3 referred to when dealing with case 4, who died, and, another,

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the wife of patient 29, who survived. The average number of spirochætes per field in her blood was 15. I have also seen this fever, with spirochætes in the blood in 5 children between the ages of 4 and 6. Two were given intravenous injections. These two survived. I do not know about the others.

(5) The number of spirochætes per field (obviously an indication of the amount of spirochætes in the blood) is a rough guide as to prognosis. But a good constitution is everything. I have not seen a case showing about 20 spirochætes per field on the average recover.

(6) The initial temperature probably depends on the toxins elaborated by these spirochætes and the tissue reaction; the more the aches, the more the chances of a relapse.

(7) As soon as possible after diagnosis, we used to delouse the patients by having their heads shaved clean and giving them unguent hydrarg. co. to rub in externally.

(8) The epidemic was at its height in August, September and October. Many cases of relapsing fever might have been mistaken for plague, as this was also prevalent then at Hubli.

(9) The aches and pains persist during the apyrexial period also.

(10) In all the cases treated by intravenous injection, the temperature (except in one case) has gone down to below normal in 36 hours and continued to be so, in spite of the duration of the disease being different in different patients. The N.A.B. injections seem to have cut short the duration of the pyrexial interval. The apyrexial intervals were in the specifically treated cases, 27 days, 13 days, and 11 days before they got the first relapse. All these complained of extreme pains at the outset and then had N.A.B. 0.45 gm. each. There was another case admitted with a history of 7 days' fever with pain in back, joints, etc., but not treated—(Case 4). The apyrexial interval in this case was 8 days. So one cannot get over the fact that the specific injections cut short the pyrexial interval and prevent a relapse in the majority of the cases, and in the minority of the cases, which get a relapse prolong the apyrexial interval. Left to itself, the relapse occurs in about 7 days.

(11) To eradicate the disease completely we used to give another 0.45 gm. N.A.B. about 5 days after the temperature came down to all the patients who were treated latterly, and none of these had a relapse.

(12) Some patients vomited Ascaris after an N.A.B. injection (? relapse).

(13) The attached chart, the temperature of case No. 15, demands some explanation.

I am extremely grateful to my chief, Dr. A. Ivan Jackson, the present Chief Medical Officer of the M. and S. M. Railway for the advice and encouragement he has given me and which he continues to give in this and other work, and for permission to publish these cases. I have also to thank Dr. S. B. K. Iyer, my colleague, for the help he gave me.

A FISH BONE IN THE LARYNGO-PHARYNX.

By F. D. BANA, M.B., M.R.C.S., D.P.H., D.T.M. & H.,
Grant Medical College, Bombay.

A LALIA BOY, aged 20, servant to a Mr. D., complained of a fish bone having stuck in his throat three days before when eating *ramus* fish. It is very usual for this type of servant as well as cooks and menials to come to hospital complaining of fish, chicken, or mutton bones as having stuck in their throats after a heavy meal composed entirely or mainly of fish, chicken or mutton on festive occasions. As a rule the bone is not found, having been swallowed by the patient, who complains of the sensation of a foreign body and rawness left by the passage over an inflamed tonsil or pharynx. Occasionally such a foreign body does stick, and when seen is removable. Such was the present case.

When removed, it was a medium sized slightly curved fish bone, size 1½ in. by 1|8 in. by 1|16 in., flat on the sides and sharply pointed at one end with a broken tip at the other. It was embedded entirely in the right pharyngeal vestibule into the loose areolar tissue by the side of the larynx, and the tip showed with difficulty as a small black spot with a white edge on the red vestibule. On casual examination with the tongue depressor and with the fingers it was not visible nor palpable. The tip could just be seen with the laryngoscope on careful and persistent examination after cocainising the pharynx and larynx. The bone was removed by Mackenzie's laryngeal forceps by the indirect method after some struggling and difficulty. Fortunately there was no previous meddling outside and œdema was absent, as otherwise such a sharp embedded foreign body is impossible to remove until after ulceration. The pharyngeal vestibule is very frequently the site for foreign bodies to lodge in when obstruction occurs in swallowing them. It is easy to remove big flat bodies like buttons or a dental plate or a mutton bone, but it is often very difficult to trace a slender sharp body like a fish bone and especially so when it is deeply embedded into the tissues.

Corrigendum.—With reference to Dr. A. Bayley de Castro's article in our issue for last September, the author has requested us to make the following corrections:—

On p. 463, first column, please read "29th March 1924" for "29th March 1923"; and in the last line of the second column, please read "3 months old" in place of "16 months old." The error arose through the author being called in in consultation about both the patient's children; one who was then 16 months, and the other then 3 months old.—EDITOR, *I.M.G.*

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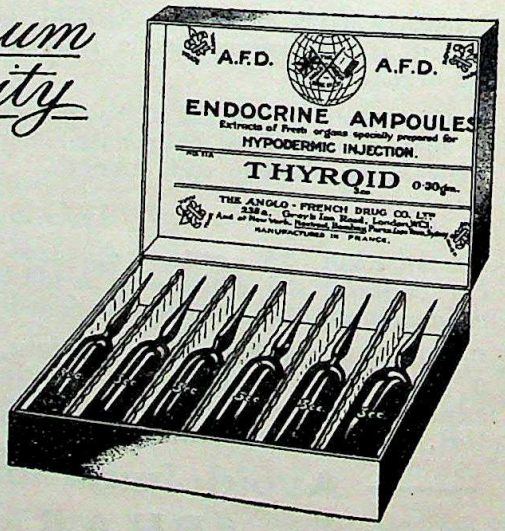

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Indian Medical Gazette.

DECEMBER.

SOME EXPERIMENTS FOR THE SOLUTION OF THE RURAL HEALTH PROBLEM OF INDIA.

UP till recently no serious attempt has been made to deal with the health problem of the village communities of India except on the most perfunctory lines.

The article by Col. Dunn, I.M.S., Director of Public Health of the United Provinces in the *Gazette* of April 1924, told of one plan for dealing with the problem. His method is to employ a sanitary worker for each definite small area of the district, and the experiment holds out great promise of success. Another plan was recommended by a conference of district boards and municipalities of Bihar and Orissa in December 1921; this was practically the same as the intensive rural sanitation scheme which has already been initiated as an experiment in a limited area in Gaya.

The basis of the plan is that the medical and sanitary staff of the rural areas should be united into one public health organisation. As originally carried out in Gaya, the scheme was essentially one of sanitary work only, but this was not popular and in February 1923 the District Board of Gaya sent up proposals to Government for extending the scheme to the whole of the district and for including medical relief in the scheme. The district was divided into 44 circles, each of about 100 square miles. In the centre of each was located a dispensary with a sub-assistant surgeon, a compounder and seven coolies. Each of the doctors in charge is paid Rs. 100 a month, and in spite of the smallness of the pay there were no less than 800 applicants for the posts.

The duties of the doctor are to attend at the central dispensary at fixed hours on each morning, to attend on regular days at each of 12 sub-centres to give medical relief to the people of the locality. He is also expected to see bed-ridden patients at their own houses, to inspect and clean the wells of the villages, to arrange for the removal of any nuisances which he may discover during his inspections of the villages, to give instruction to the villagers and school children on matters of health, and most important of all to proceed at once to any place in which cholera, plague or other epidemic breaks out and take such action as is within his powers. He also reports at once to the district health officer who is in charge of all the dispensaries, and in this way provision is made for immediate steps to deal with the epidemic. The health officer has an emergent staff which is available for epidemic duty when required.

The scheme thus provides medical relief to the villagers; in this way their good will is secured, and the doctor becomes known to them as a benefactor who will therefore be certain of their co-operation when measures for dealing with an epidemic are called for. The scheme has been in working only since the 2nd of June, 1923, and so it has had little time to become soundly established. In spite of this the record of work is remarkable, during 1923 no less than 270,000 patients have been treated, of whom 10,000 have been visited in their own homes, 982 villages were cleaned by the coolies, 12,389 wells have been cleaned and disinfected, 12,000 leaflets were distributed and many lectures were delivered with the aid of the magic lantern. Classes for village schoolmasters are being arranged for, and it is hoped to inaugurate regular courses of instruction for the children in the schools of the districts. It is not possible to give full details of the working of the scheme, but the report of Dr. R. N. Bansikar, the Chief Medical Officer, shows that a strenuous effort is being made to make the scheme a success.

In a resolution of the Government of Bihar and Orissa, dated the 5th February, 1924, doubts were expressed as to the desirability of throwing such a burden of work on the local doctors and as to their capacity for dealing with epidemics when they break out. Government thinks that it is desirable to make the local doctor responsible for taking the first steps on the outbreak of an epidemic within his area, and for making a report to the Civil Surgeon and District Board who will arrange for dealing with the outbreak by the public health staff.

The public health staff suggested by Government would consist of one health officer, four health inspectors, twelve sanitary gangs of four men each, and provision would be made for the supply of disinfectants, etc., and for rewards to *chowkidars* who will be furnished with a series of coloured cards in triplicate; one of these cards is already stamped and addressed to the health officer, the second will be delivered personally to the local doctor and the third to the *thana* officer. Red cards signify cholera, yellow cards small pox, and blue cards plague.

The resolution criticises the scheme as omitting all mention of the Civil Surgeon, but it is understood that the Civil Surgeon is one of a managing committee of three which administers the scheme, and in his capacity as the technical member of this committee it is believed that he will be able to exercise great influence on the working of the scheme, and will also have full powers of inspecting the dispensaries which are established in his district.

The resolution recommends the formation of a central reserve organisation which will be maintained by Government to aid the boards in times of emergency. The Bihar Government does not approve of the combination of medical relief and public health work except in cases of emergency;

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this is the point which is likely to arouse most discussion.

It would seem to be desirable to give the Gaya public health organisation a full and fair trial and at the same time to try experiments in other districts on the lines which commend themselves to Government; time and experience will show which of the schemes is most successful. So far as can be judged by the reports, the scheme which is being worked in Gaya has been warmly received by the people of the district; in the short time for which it has been in operation it has achieved a considerable measure of success and apparently there has been no difficulty either in recruiting local doctors of the required class or in replacing those who have not been able to accept the somewhat arduous duties which are imposed on them. For the scheme to be a success it would appear that the chief medical officer must be a man of great energy and enthusiasm, and that he should receive the fullest support and encouragement from the managing committee of which the Civil Surgeon must be a member.

One point in which improvement appears to be desirable is that the local doctors should have a special course of training in the details of their duties. They must be taught how to diagnose and treat the most important diseases which they meet with in their zones of work, what steps to take when an epidemic breaks out and how to conduct propaganda work. It is not to be expected that a sub-assistant surgeon should be competent to carry out these duties with great efficiency unless a special course of training is provided. There will be much difference of opinion as to whether medical relief and sanitation in each small area should be combined or kept in separate compartments, but there is a large volume of opinion in favour of employing medical relief by the man on the spot as the means of securing the good will of the villagers, and thus inducing them to accept readily the public health measures which are required in cases of epidemics. The conditions in the villages are quite different from those in large centres of population, and we do not yet know the best means of dealing with these conditions. It is only by experiments carried out under careful supervision that the best procedure can be arrived at.

The zeal and enthusiasm of Dr. Bansikar are worthy of the highest praise, he himself recognises that the scheme is to some extent experimental, that it is likely to be capable of great improvement in the light of further experience, and it is to be hoped that he will be given full support in his effort to make it a success.

Another scheme which has some interesting points is that of the Central Co-operative Anti-Malaria Society of Bengal. The moving force has been Rai Bahadur Dr. G. C. Chatterjee. The object of this organisation is to create public health societies on a co-operative basis throughout the villages of Bengal. Each society is autonomous, the part played by the central body being to maintain propaganda, and to advise the small societies as to the best methods of preventive work. From small beginnings in 1914 gradual advances were made and the society became a registered co-operative concern in 1919. Anti-kala-azar work was taken up on a large scale in 1923 and this has proved even more successful than the anti-malarial work, thanks to the great popularity of the antimony treatment as administered by a resident medical officer or by volunteers from Calcutta. About thirty-three centres are now in existence and no less than 6,367 kala-azar patients have been treated up till the end of 1923; more than 2,500 of these were treated in the centres of Bamungachi and Bistoopur.

The only disquieting feature is the fact that the average number of injections given to each patient has been less than ten. For the ordinary antimony treatment this is far too small a number, but it is impossible to keep the patients under control, and when they find that their fever has been checked they consider themselves cured and cease to attend. Dr. Chatterjee believes that it will be possible to control the ravages of the disease by treatment even of an incomplete kind, and as evidence of this he points to the fact that after a steady increase of the patients attending each centre there comes a time when very few new patients appear. It is most important that this point should be carefully investigated, as the dread scourge of kala-azar will be easily capable of being controlled if it be found that the treatment of all the cases in a village is followed by a cessation of fresh infections. Dr. Chatterjee has received munificent help from a number of philanthropists. Lord Ronaldshay subscribed Rs. 10,000 and the District Board of the 24-Parganas gave a similar amount. Great help has been received from Dr. Bentley, the Director of Public Health of Bengal.

It is likely that other experiments with similar objects are being carried out in various parts of India; we hope that those who are responsible for these will send in brief reports of their working for the benefit of all who are interested in this very important question.

It must be clearly recognised that there is no one ideal scheme, the disease problems of various parts of India are widely different and so are the local conditions. Each part of India must work out its own method, but the success or even the failure of any given scheme will furnish valuable evidence of the inherent worth of the plan and of the likelihood of its being applicable in other places.

What is quite certain is that definite and deliberate organisations are needed and that these must be worked with energy and optimism. If each province were to try two or three well considered schemes under strict control, it does not seem impossible that the vast problem of the

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health of the Indian villager might soon come within sight of solution.

It must be clearly understood that the discovery, even of a perfect scheme for dealing with rural sanitation, does not constitute a solution of the great problem of disease and poverty in India. If the problem were dealt with only from the point of view of disease, complete success might bring in its train evils greater than those which we are attempting to remove. The increase in the birth rate and the fall in the death rate would very soon bring about so great an increase in the population that the food supply would inevitably be less than the requirements of people. When we begin to tamper with a balance which results from the workings of natural forces through many generations we must act with the greatest circumspection, and we are faced with certain hard facts of which the most important is that the population must be adjusted to the food supply. During the past century the adjustment has been made in India chiefly by disease. If we suddenly eliminate disease we must be prepared to accept famine as an alternative unless we succeed in educating the people to adopt other means of controlling the population.

Increased efficiency due to the prevention of disablement by disease will result in a larger food supply, irrigation projects and improvements in agriculture and industries will provide for a considerable increase in the population, but in time the limit will be reached. We can either leave the problem to the coming generation to deal with, in the hope that the growth of education and enlightenment will enable our successors to cope with the question of over population, or we may take time by the forelock and give definite instruction to the rising generation which will teach them how to adapt themselves to their environment by such means as later and more provident marriages. We cannot remain satisfied with eliminating disease without also making provision for controlling the unrestrained increase in population, in other words if we set about improving the environment of the people of India by the application of the discoveries of science, we must do so in a scientific manner and not by the short-sighted policy of remedying one great evil at the cost of introducing other and even greater evils. It is for these reasons that we have for several years strongly advocated the thorough examination of the whole question by a strong committee of the best brains which it is possible to secure. The recognition of the complexity and difficulty of the problem is not a reason for shelving it, but is rather a reason for tackling it with resolution and circumspection.

The experiments on village sanitation, which are being carried out, need not be abandoned pending the completion of the enquiry; on the other hand they ought to be pushed on with vigour, their results will be of immense value in enabling us to institute promptly such schemes as have been found successful. The prevention of incapacity and death caused by preventible disease undoubtedly represents the first line of action that is needed, the other advances will become essential after success has been attained by the campaign against disease. We need not be deterred from taking the first step because the subsequent steps have not yet been taken, but we ought to lose no time in making plans for the subsequent steps.

It is certain that success in the first step will make it possible to take the further steps. If we do not make a beginning we must accept the indefinite prolongation of the existing miserable state of affairs which consists in a limitation of the population by the dreadful and horribly expensive process of disease and death.

Mere changes in the system of government, even if they be for the better, will not solve the problem. The lines of Goldsmith apply with great force to India,

> "How small of all that human hearts endure
> The part that laws or kings can cause or cure?"

The conflict of parties or races for self aggrandisement may result in temporary advantages to one section of the population, but if the real wrongs of India are to be righted what is needed is the united efforts of the educated and enlightened section of the community, irrespective of race or creed. A definite policy and a definite organisation must be planned and carried out, and for this to be effective there must be whole-hearted co-operation and combination of all the effective forces of India. If a rational plan of campaign is placed before the people, is it conceivable that any section of the community will withhold its help?

The whole question must be raised above the plane of party politics; whatever changes take place in the system of Government of India, the first and greatest needs of the country are health, prosperity and security.

J. W. D. M.

SPECIAL ARTICLE.

A COMMENT ON THE REPORT ON MATERNAL MORTALITY DURING CHILDBIRTH IN ENGLAND BY DR. JANET CAMPBELL OF THE MINISTRY OF HEALTH, WITH A REFERENCE TO MATERNAL MORTALITY IN INDIA.

By MISS M. I. BALFOUR, M.B., W.M.S. (retired),
Late Secretary to the Countess of Dufferin's Fund.

THE report is divided into four sections, the first of which deals with statistics, the second with the general incidence and causation of the mortality, the third gives a detailed description of the different causes, while the fourth deals with prevention.

We learn that since the beginning of the century general mortality in England has fallen by one-third and infant mortality by one-half, but there has been no similar decrease in maternal mortality, in fact since the year 1910 there has been no reduction at all. The

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maternal mortality for the year under consideration (1922) was just under 4 per 1,000 cases of childbirth, that is there were in all 2,971 deaths. Deaths from childbirth form the third largest group of causes of death in women of the child-bearing age (15 to 45), only those due to tuberculosis and heart disease exceeding it, while those due to cancer run it very close.

An international comparison places England fifth among the following 10 countries:—Scotland, Spain, Switzerland, France, England and Wales, Germany, Norway, Italy, Sweden and Holland. Of these countries Scotland is the highest with a mortality rate of 5.70 per 1,000, but it is noteworthy that the Scottish Deparmental Committee's Report on maternal mortality in that country points out that owing to fallacies in the Scottish method of reporting deaths there is a falsely increased rate and claims that the mortality is about the same as that of England. Dr. Campbell herself gives the figures with reserve on account of the errors arising from different methods in different countries of compiling statistics.

As regards the general incidence it is noted that mortality is greater in very rural districts and in industrial areas.

Among the general causes great emphasis is laid on the quality of the professional attendance. Between 50 and 60 per cent. of cases of childbirth are attended by midwives and the remainder by doctors. It appears that the mortality is less among the midwives' cases, which may partly be due to the fact that the midwife is not engaged in the treatment of outside septic cases, but also because she is only supposed to accept cases of normal labour.

A number of instances are given of negligent or improper treatment on the part of the professional attendant. We are accustomed to read of such instances on the part of midwives in the records of the proceedings of the Central Midwives' Board, but it will come as a surprise to many that equal negligence is sometimes shewn by doctors. For instance:—

A midwife's case.—Doctor called at 9 p.m., August 18th. Baby had hydrocephalus. The doctor performed craniotomy and then further reduced the size of the head with forceps, the child being delivered at 11-40 p.m. The doctor did not again call until sent for by the midwife on the 24th. By that time the lochia were offensive, the pulse was rapid, the temperature raised. He merely ordered medicine. He called again on the following day, but the patient died at 4-30 p.m. It is perhaps worth noting that the doctor sent in his claim for attendance under the Midwives' Act on August 20th, apparently indicating that he did not propose to visit his patient again.

It is pointed out that the training of medical students in obstetrics has been very imperfect as compared with that in medicine and surgery and that there are great variations in the obstetric skill of general practitioners —some being careful and experienced, others very much the reverse, especially those who are engaged in busy industrial practice with little time and perhaps little interest to spare for the abnormal cases of childbirth, which for success require special knowledge and patience.

General surroundings of the patient are not found to be of great importance. That is, patients confined under the worst conditions as regards hygiene will make excellent recoveries, whereas those under the best hygienic conditions will succumb as the result of a careless examination.

Abortion and rickets are mentioned among general causes, also employment, although it is not considered that the last has a widespread effect.

The three chief specific causes of maternal mortality are in the order given—sepsis; the toxæmias (albuminuria, vomiting, eclampsia); and hæmorrhage. In 1922 out of a total of 2,971 maternal deaths, 1,079 were from sepsis, 556 from the toxæmias, 390 from hæmorrhage.

The great majority of the cases of sepsis are due to carelessness on the part of the professional attendant and especially in connection with prolonged or difficult cases of labour. Intra-uterine manipulation, lacerations of the passages, manual detachment of the placenta account for many cases, while severe hæmorrhage and exhaustion are important predisposing causes. Reference is made to the correspondence in the *Lancet* in 1923 regarding the proper conduct of labour and to the advice given that the pubic area should be shaved, the perineum and surrounding parts painted with iodine or other antiseptic, the adjacent parts covered with sterilised towels, while the attendant should wear a sterilised gown and gloves and an anæsthetist be at hand.

It is pointed out that while such a routine may be and is carried out in hospitals and in many better class houses, it is impossible in the majority of poor houses In such cases gowns are seldom worn and gloves are an exception,—

"you find a bed which has been slept in by the husband, wife and one or two children; it has frequently been soaked with urine, the sheets are dirty, and the patient's garments soiled; she has not had a bath. Instead of sterile dressings you have a few old rags, or the discharge is allowed to soak into a night-dress which is not changed for days. Lastly there is no skilled assistance. No surgeon would undertake a hysterectomy under such conditions, and yet the practitioner has frequently to give an anæsthetic, apply forceps and deliver the patient."

Dr. Campbell says—" the practical issue before us is how, with a limited amount of money to spend, we can so improve existing conditions as to escape unnecessary misadventure."

It is pointed out that obstetric operations are often performed under the most difficult conditions and result disastrously in consequence. They are sometimes undertaken lightly without sufficient skill or judgment, and without sufficient consideration of the possibility of removing the patient to an institution. The antiseptic precautions are sometimes inadequate and no proper nursing is possible. A number of examples are given of which the following are typical:—

The patient, aged 33, engaged a doctor two months before her second confinement was expected. No antenatal examination was made, although the first confinement had been instrumental. Forceps were applied for a prolonged second stage. Boiling water was poured over them to sterilise them. No gloves were used. No anæsthetic was given. The child was delivered after 1½ hours' manipulation. The perineum was torn but not stitched. The patient was very exhausted and never rallied. She had a rigor and other symptoms on the second day. She was nursed by a handy woman and no special treatment was given until she was sent to hospital on the fifth day. The uterus was evacuated and placenta and membranes removed. Laceration of the soft parts was found. Patient died a week later. Child born alive.

(2). 2-para, aged 24. First labour difficult with still-born child. No ante-natal examination. No preparations were made for a difficult labour. The pelvis was contracted and the child was large. Forceps were applied, boiling water and lysol having been poured over them. No gloves were used. Perineum was seriously injured and there were injuries to the soft parts. The temperature was raised on the first day and was 105°F. on the fourth. Patient was nursed by the midwife, vaginal douches being given three times daily. The patient died on the fifth day. The child was still-born.

Notification of puerperal fever is required under the Notification of Diseases' Act 1899. The results have not been so satisfactory as expected. There is evidently in some parts incomplete notification, as is evidenced by the fact that the deaths reported in some places exceed the number notified. This is perhaps due to the uncertain nature of the symptoms and to the unwillingness of the medical attendant to admit that they are due to sepsis. The object of the notification of infectious diseases is of course to enable the Health Department to prevent

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the spread of the disease as well as to assist the individual doctor and patient. As regards puerperal fever this object is being very imperfectly fulfilled at present.

As regards methods of prevention of maternal mortality the field is a very wide one. There are, however, three special avenues which may be discussed.

FIRST.

Improvement of the quality of professional attendance.—The training of medical students in obstetrics has already within the last year or two been greatly improved, the intention of the General Medical Council being to give it a status not inferior to that of medicine and surgery. This cannot fail to have a far-reaching effect on the midwifery practice of the future.

The training of midwives has also been improved of late years. The period of training was in 1916 increased from 3 months to 6 months, and a further extension is at present under consideration. Further, co-operation between doctors and midwives is needed. There is no doubt that pregnancy should be under medical supervision, but also that each case requires thought and careful attention to detail which the busy practitioner may not have time to give. The doctor might delegate to the midwife the actual conduct of the case (which she is quite competent to carry out), holding himself ready to attend when needed and taking the necessary ante-natal supervision.

SECOND.

Action through Public Health Authorities.—The existing enactments which give powers to the authorities are the Factory and Workshops' Act; the Midwives' Act, 1902; the Notification of Births' Act, 1907; the National Insurance Act, 1901; and the Maternity and Child Welfare Act, 1918.

One of the most important activities of Local Authorities under the Maternity and Child Welfare Act is *ante-natal supervision.* This is the keystone of the reduction of maternal mortality and definite progress will never be made until its importance is recognised by patients and their attendants alike.

Figures of the Louise Mary Hospital at Aldershot are given, where under a careful system of ante-natal supervision, the mortality was reduced to two deaths in two thousand cases.

Ante-natal supervision detects the toxæmias at an early stage of pregnancy and by careful treatment in hospital carries them through the danger period. It detects pelvic contraction, malpresentations and other causes likely to produce difficult labour, with the result that the patient is advised to enter hospital for her confinement or suitable arrangements may be made at home, so doing away with the necessity for these terrible cases of operation carried out without preparation under nearly impossible conditions. But in order to carry out ante-natal supervision among the poor it is necessary to have special centres, beds in hospital, emergency nurses, etc.

Lying-in hospitals are too few in number. Poor-law institutions frequently have maternity beds not fully used and it would be well for the local authorities to come to an agreement with the Poor-law authorities for the part use of these wards. Maternity homes with 15 to 20 beds have been opened in many places, half the cost being paid by the Ministry of Health. This is a more expensive plan than if one or two large lying-in hospitals were opened, but has the advantage of bringing the help to a much larger number of people. It is of great importance that lying-in hospitals and maternity homes should be kept up to a high standard, otherwise the rate of mortality may be increased rather than diminished. At the present time there are no general powers of registration or inspection, but in certain areas local registration and inspection is carried on in a satisfactory manner. It is hoped before long that all lying-in institutions in the country may be subject to similar supervision.

The supply and control of midwives is an important duty for local authorities. In the large towns the supply of midwives is usually sufficient, but not in rural areas, because in rural areas it is difficult for a midwife to make a living wage. Many district and county nursing associations exist which provide midwives and these are making progress in the establishment of a complete service. If the supply is still unsatisfactory it is open to the local authority to increase it by the appointment of midwives to practice in certain localities, the whole or part of their salary being paid by the local authority.

Post-certificate courses of instruction or "refresher" courses are recommended. Certain local authorities such as the London County Council arrange excellent courses, and the Board of Education has offered grants-in-aid to midwives attending of £1 per week up to a maximum of £6. This does not cover the whole cost to the midwife and the difficulty in finding the balance has rendered the attendance so far small.

The provision of sterile maternity outfits to be given or sold at cost price has been carried out in Birmingham and Blackburn with success.

The appointment of obstetric consultants should be taken into consideration. Many general practitioners hesitate to undertake surgical operations and send them to experts, but the same men are expected to attempt any case of difficult midwifery without assistance and with little preparation. The most serious decisions affecting the lives of mother and child have to be taken and the operations involved are such as require special qualities of skill and experience. The doctor will be blamed for any error of judgment leading to catastrophe. In cases of this kind the advice of a specialist would be invaluable and would be welcomed by many practitioners. The local authorities might be empowered to make arrangements with an obstetrician to be called in by the doctor in cases of emergency, a special fee being payable for his services.

Isolation beds should be provided for puerperal sepsis, preferably in connection with existing hospitals.

Investigation into the causes of maternal deaths should be more carefully carried out.

THIRD.

Social and Educational Measures.—A woman insured under the Insurance Act of 1911 obtains a maternity benefit of £2 for her confinement, and if her husband is also insured of £4. There is no control over the manner in which she spends it. While this payment is undoubtedly a boon to poor mothers and enables them to provide themselves with more comfort and better attendance, it has not produced any fall in the maternal mortality. In the Scottish report a suggestion is made that the payment of the benefit should be made conditional on the woman producing evidence of ante-natal supervision as well as of delivery.

It is evident indeed that all measures taken for the improvement of the conditions of childbirth will be handicapped until mothers understand the importance of putting themselves under medical supervision as soon as pregnant, and it is very necessary that the need for ante-natal supervision should be more realised by doctors and midwives.

At first sight the reading of this report must be somewhat depressing to obstetricians in India. We hear that a country which has met with signal success in combating the general and the infant death rate, which has spent money freely and has passed several special enactments for the greater protection of women in childbirth, has as yet done little to reduce the maternal mortality. What hope then can there be for India, where every distressing condition endured by mothers in England is magnified a hundredfold? And where the opportunities for the training of doctors and midwives are small as compared with those in England?

It is difficult at the present time even to form an estimate of the rate of maternal mortality in India. In the report of the Commissioner for Public Health with the Government of India for 1921 the maternal

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mortality rates for 60 towns in ten different provinces in India are given. The rates range from 1.2 to 59.7 per 1,000, and taking the average work out to about 14 per 1,000. The great variation in the figures for different cities leads to a suspicion that in some the rates should be higher than those given, and there can be little doubt that in the *mofussil* where there is often no medical relief the figures must be higher still. The births in India in 1921 were 7,774,776, therefore the maternal deaths—taking the death rate as 14 per thousand births—would be 108,852.

Much is being done in India for the training of midwives and something for the provision of more lying-in hospitals, which the movement for infant welfare and employment of health visitors will help to popularise. But this is not all that can be done and a careful study of the English report will throw some light on measures of relief for women in childbirth in India.

The points in that report most strongly emphasised and insisted on are the need for continued and increased ante-natal supervision and improvement in the quality of professional attendance.

Now as regards the first, we may agree that India is not yet ready for a Maternity and Child Welfare Act, and that local bodies will not unassisted set up ante-natal centres, at least to any extent. Indeed, if they did so, it is very probable that the centres would be empty or would soon degenerate into ordinary dispensaries, because the people do not yet appreciate the need for preventive medicine. But when we talk of ante-natal work we are too apt to forget that it does not necessarily mean a municipal centre and a grant from Government. There is nothing to prevent every medical practitioner from gradually forming his own ante-natal centre in connection with his own consulting room, so saving individual life and so spreading among his better class patients and among midwives the importance of this work. Indian doctors and midwives together can lay the foundations of ante-natal work which will be taken up later by local bodies.

As regards the second point, the quality of the professional attendance, efforts are now being made in India to improve the obstetric training of the medical student. Whether these efforts prove successful or not, the practitioner who expects much obstetric practice (if a visit to England is impossible) can still take up post-graduate obstetric work in Madras or Bombay. Even if that is not open to him, he can do a great deal by reading, care and thought. Called to a serious case where an obstetric operation is needed, he can arrange to remove the patient to a hospital if possible, or at least insist on a trained nurse, and he can take pains to carry out all the antiseptic precautions which he has learned in connection with surgery.

The carrying out of the suggestion for obstetric consultants would be excellent in India. Such consultants would preferably be medical women with special obstetric experience and might be appointed at first in the large towns as part-time officers. No one who has seen much of obstetric practice in India can fail to realise the terrible suffering endured both by the women who die undelivered, and by the women who are subjected to the most difficult obstetric operations at the hands of inexperienced obstetric practitioners.

The suggestion in the report for further co-operation between doctors and midwives, so that all cases of pregnancy and labour should be under medical supervision, while all cases of labour should actually be conducted by the midwife (so long as no deviation from the normal occurred) is one well worthy of attention in India. Male doctors—owing to feelings of delicacy—are frequently debarred from attending cases of childbirth, but there is no reason why they should not retain a staff of *dais* who will visit the patients, conduct the deliveries and report any abnormality. There is one essential, on the observance or neglect of which the scheme will stand or fall. The doctor must hold himself responsible for the *dai's* work and must satisfy himself that she is careful, efficient and aseptic. He must not allow her to exceed her duties by attempting to diagnose or treat cases of disease.

The practice of midwifery in India has been handicapped by the prejudices which have largely excluded practitioners of medicine from the lying-in room, but now that modern science is coming more and more to recognise the importance of supervision and of a scientific understanding of the conditions of pregnancy, even if the doctor is not present at the birth, it is to be hoped that the profession will take the matter up in a great effort to remove the reproach which must rest on a country which fails to provide for the mothers of the nation at the time of their greatest need.

Current Topics.

Local Immunity in Infectious Diseases.

Trans. Roy. Soc. Trop. Med. and Hyg., Vol. XVII, Nos. 6 and 7, p. 346.

A VERY interesting paper by Professor A. Besredka, of the Pasteur Institute of Paris, was read at the meeting on January 17th of the Royal Society of Tropical Medicine and Hygiene in London by Dr. Harry Plotz, who had come from Paris to read it. The paper summarised the well-known work of Professor Besredka during the last few years on the oral administration of vaccines.

The author first pointed out that hitherto the defensive mechanism of the skin has been considered as merely a mechanical one, interposing a barrier between the invading germs and the body tissues. Yet there is evidence that the skin can take an active part in the genesis of a generalised disease, and further, that it can intervene actively and independently in the process of vaccination and in the contribution of a general immunity. Hitherto the guinea-pig has been held to be exceedingly susceptible to infection with anthrax, and it was believed that it could acquire no immunity to this disease. Yet Besredka and his colleagues have shewn that the virus of anthrax may be inoculated into the peritoneal cavity, the trachea, the intestinal canal, the blood stream and even the subcutaneous tissues of the guinea-pig, and will not take so long as the skin itself is not infected; also the animal can be rendered immune to anthrax by rubbing attenuated anthrax virus over a large surface of skin after inoculating the same virus into the skin at one or more points; the animal may even resist thousands of times the minimum lethal dose. In such cases the skin—as an organ of the body—has acquired a definite immunity, yet there is little or no evidence of the formation of immune bodies in the blood.

Many viruses shew a selective affinity for different tissues,—the enteric group, dysentery bacilli and cholera vibrio for the intestinal canal. If these viruses are injected into the peritoneal cavity or intravenously or even subcutaneously, the only part of the animal which shews any reaction is the intestinal canal,—it is here that the virus is found, and most often in pure culture. This suggested the possibility of oral vaccination and an attempt to render the intestinal epithelium immune. Rabbits so treated with Shiga vaccine shew a solid immunity, without, however, any serological response, and the serological response is not always a measure of the degree of immunity,—as other workers have long held.

Applying these principles, Nicolle was the first to use dysentery vaccines orally in man. Two Europeans were given entero-immunity by swallowing killed cultures of dysentery bacilli. 15 and 18 days later, these two, as well as two non-immune controls, ingested a living and virulent culture of dysentery bacilli; the controls contracted the disease, the two persons treated remained

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perfectly well. In July 1923 a severe epidemic of Shiga dysentery broke out among troops at Versailles. Of a total of 1,616 soldiers exposed to risk, 546 were vaccinated by the oral route and 1,070 acted as unvaccinated controls; among the vaccinated there were 42 cases—incidence 7.7 per cent.; among the unvaccinated, 287 developed dysentery—incidence 26.9 per cent., and five died. In a refugee camp in Petrograd in July-August 1923, an epidemic of dysentery broke out. The camp contained 2,768 persons. On the 3rd of August the Inspector of Hygiene for Petrograd orally vaccinated 1,000 of these persons with a mixed vaccine of Shiga, Flexner and His strains. Among the vaccinated 9 cases of dysentery developed,—six of them almost directly after vaccination, before there was time for immunity to develop; among the 1,768 non-vaccinated there were 56 subsequent cases.

The problem of vaccinating against typhoid and cholera should be studied from the standpoint of the mechanism of infection with these bacteria. The rabbit, especially, is not susceptible to infection by ingestion in the ordinary way; large doses of living virus may be introduced orally without harmful effects. But this natural immunity of the intestinal epithelium may be overcome; if ox bile be administered there is a desquamation of the cells of the intestinal mucosa and absorption of the virus follows. Ox bile renders the animal more receptive to the virus, whether introduced by the mouth or inoculated intravenously. In animals so sensitised and then injected with living typhoid or cholera cultures, it is found that the bacteria are present only in the intestinal wall, and are absent from other organs; in other words the intestine is the receptive organ for typhoid and cholera, just as the skin is for anthrax. Previous administration of bile, followed by a dose of vaccine orally confers a solid immunity; the results are better than are results with vaccine given subcutaneously, and the reason why such vaccines are more efficient if given intravenously than when given subcutaneously is probably that more of the virus reaches the intestinal wall by the former method.

At Fremicourt 1,236 persons were vaccinated orally with typhoid vaccine; each person received on three successive days before breakfast a dose of bile, followed by a pill of desiccated heat-killed typhoid and paratyphoid bacilli. There was practically no reaction at all, only a few of the subjects complaining of malaise; even pregnant women and those treated during the catamenial period shewed no ill effects and the method proved very suitable for children. Among a general population of 2,000 exposed to the infection, of whom some 650 were not vaccinated, there were 29 cases before vaccination and 21 cases after. Of the 1,236 persons vaccinated only five developed typhoid fever,—three of them on the day following vaccination.

A severe epidemic of typhoid broke out at the military school at La Fleche during the spring of 1922. The first case occurred on the 8th of April, and by the 18th of April there were 43 cases, of which 2 died. Universal vaccination was now ordered, 268 students being given the vaccine orally, and 253 subcutaneously. 5 cases developed among those orally vaccinated; 10 cases among those subcutaneously vaccinated.

The author concludes that antibodies may play but a minor rôle in the immunity following on vaccination. The interval between vaccination and the development of immunity may not be one due to the formation of antibodies, but a period necessary for the disintegration of the bacterial bodies which, on disintegration, set free active principles which immunise the susceptible cells. These active principles are set free when the bacteria are phagocytosed by the leucocytes; and are also present in a cholera culture in broth, filtered free from bacteria and heated to 100° to 120°C. The immunity of the cells is brought about by direct contact of the virus with the susceptible cells.

Turning from intestinal to skin diseases, the author next proceeded to the study of infections with the staphylococcus and streptococcus. If a dressing soaked in staphylococcus vaccine, or—better still—in a filtrate of an old staphylococcus culture, be applied to the skin of the abdomen of a guinea-pig, the animal becomes immunised. The subsequent inoculation subcutaneously of living staphylococci causes no reaction, whilst a control non-treated animal may die from such injection. With both the staphylococcus and streptococcus solid immunity may be conferred upon the skin in so short a time as 24 hours. Yet with both bacteria, anti-sera are but weak products and serological reactions negligible. The treatment is now being extensively tried clinically, cases of furunculosis, boils, septic fistulæ and osteomyelitis having been treated with success by applying dressings soaked in staphylococcus-broth filtrate. A specific desensitisation seems to be produced which confers local immunity upon the skin.

The author concludes that the true mechanism of vaccine therapy is not the formation of anti-bodies which protect the body, but rather the protection of such cells as still remain uninjured by desensitising them. The active principles, liberated on the break-down of the bacterial bodies, are absorbed by those cells which are still uninjured by the disease, and these now become desensitised to the virus.

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As might have been expected, Professor Besredka's very remarkable paper gave rise to a brisk discussion in which several of the leading London pathologists took part. Dr. J. C. G. Ledingham said that the theory, whilst admittedly attractive, failed as yet to command general approval. In the case of anthrax, and the *Bacillus pestis* mere application of cultures to scarified areas is followed by rapid generalisation and death in the guinea-pig. The skin, in fact, appears to possess a low and not a high degree of defence. Professor Besredka started by breaking down the natural immunity of the rabbit's intestine by the administration of bile. Having done so, he builds it up again by oral administration of killed cultures. "One would pay the greatest respect to these experimental results if one could repeat them with ease, but repetition of these experiments by other workers has, so far as I am aware, not led to confirmation." Zingher and Soletsky failed completely with paratyphoid cultures, whilst Kanai, working at the Lister Institute, obtained only a low degree of protection by oral administration of Shiga vaccines, but a high degree on subcutaneous administration. Whilst not hide-bound with regard to agglutinins, yet he held that as a rule such agglutinins do appear at a time when early immunity appears, and one cannot afford to ignore their presence, and possible rôle. With regard to the field experiments, it was most important that such work should be fully controlled if the data are to be of value for purposes of comparison.

Colonel D. Harvey dwelt upon the fallacies of vaccination statistics collected during the decline of an epidemic; it is well known that if vaccination be introduced during the decline of an epidemic, the post-vaccination figures will give more favourable data than the pre-vaccination ones, owing to the natural decline of the epidemic itself, and not to the vaccination,—a fallacy constantly met with in field work. The affinity of the dysentery toxins for the intestinal mucosa had been shewn many years ago by Colonel Firth, who had found that a dose of dysentery bacilli could be neutralised by an emulsion of intestinal wall from the rabbit, whereas emulsions of the brain, spleen, liver and muscles had no such effect. Did the same sequelæ follow upon the administration of ox bile in man as in the rabbit, and was the procedure free from the possible danger of laying the gut wall open to invasion by *Entamœba histolytica* and other pathogenic organisms? Finally, in the army, administration of tablets was a less certain method of administration than the subcutaneous route.

Dr. F. H. Teale pointed out that most living bacteria,—with the exception of a few resistant strains such as *B. tuberculosis*,—are killed in the healthy stomach. The mucosa of the intestinal canal was not merely an organ

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for absorption, it was also largely an excretory organ, and bacteria inoculated anywhere in the body, and not necessarily only pathogenic ones, may be excreted by this route. Working with vaccines orally administered, he had found that antibody production did occur, but that the titres obtained were no higher than with subcutaneous administration. The antibody question he considered to be of importance; in fact, when working with Dr. Embleton, he had found that some bacterial strains which were not pathogenic, could be made pathogenic if just sufficient immunity was conferred upon the animal to lead to the production of minimal quantities of antibody. Wassermann had used gauze dressings soaked in staphylococcus broth extract years ago in the treatment of boils. Douglas had shewn that, if all the digestible protein be removed from bacteria, the residue is still antigenic; whilst Zinsser and later Perlzweig had shewn that if all the coagulable proteid be removed from bacteria, the residue is also still antigenic. Professor Besredka's extract was therefore undoubtedly antigenic, it would go into combination with sessile antibody, neutralise the activity of the cells and thus render them less liable to interact with bacteria and provide the conditions necessary to make them produce infection.

Dr. C. M. Wenyon mentioned that preparations were in hand for testing Besredka's method on a large scale in Russia and also in Holland by the League of Nations, under the control of Colonel Perry. On the outbreak of cholera one-third of the population would be vaccinated orally, one-third vaccinated subcutaneously and the remaining one-third left unprotected; the results should be of interest. Dr. W. E. Gye said that, having been interested in Besredka's earlier papers, he had also tried to infect rabbits with *B. typhosus* after giving bile; the rabbits died of diarrhœa, but when the dose of bile (given by catheter into the stomach) was so reduced that no untoward effects followed, the dose of living typhoid bacilli also failed to infect. The subject was not free from considerable experimental errors. Dr. R. A. O'Brien had spent more than a year trying to compare the results of sensitised and ordinary anti-typhoid vaccines in guinea-pigs; the results with both were so variable that he could come to no conclusions; the subject in experimental animals was beset with difficulties. Dr. H. Stannus Stannus asked how the skin immunity produced by a local dressing soaked in staphylococcus extract spread to the whole of the skin; if through the blood stream then it would seem as if intravenous administration might be substituted. Dr. P. H. Manson-Bahr said that it seemed inconceivable that immunity could be produced without constitutional reaction or disturbance.

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In replying, Dr. Plotz said that in anthrax at least the antibodies appeared to have but little to do with immunity; thus the serum of the dog is not bactericidal to the anthrax bacillus, whereas that of the rabbit is highly so; yet the dog is not very sensitive to anthrax, whilst the rabbit is highly so. The negative results of Zingher and Soletsky were probably due to technique; those of Kanai, he could not explain. The field work of Gauthier in Greece, under the Medical Section of the League of Nations, was quite conclusive. The refugees were collected in large camps and no less than 29,880 were vaccinated orally against dysentery, and followed over a long period of time. Not one subsequently contracted dysentery. In those regions where epidemic dysentery occurred, vaccination by the oral method completely stopped the epidemics. In one camp where dysentery broke out, there were at first 400 cases with 50 deaths among a population of 4,800. Two-thirds of the population were now vaccinated orally and the remaining one-third left as unprotected controls; there was no case of dysentery subsequently among the vaccinated, whilst 194 cases occurred among the non-vaccinated.

In reply to Colonel Harvey, the dose was 20 cgms. of desiccated bile in gluten. The dose of desiccated culture of T.A.B. was 0.05 gr.

In reply to Dr. Teale, if large doses of living typhoid, paratyphoid and dysentery bacilli be given into the stomach by a gastric tube, living bacteria are found in the intestine. If the rabbit or guinea-pig be inoculated with large doses of killed anthrax bacilli intraperitoneally, subcutaneously or intravenously, antibodies can be demonstrated in the serum. Yet these animals thus inoculated cannot resist even a minimum lethal dose of living culture. If living cultures are injected intraperitoneally or subcutaneously, antibodies are produced, but the animals develop no immunity. It is only when the *skin* is immunised that the animal becomes immune. Delater had studied the antibodies in the rabbit after oral vaccination with typhoid vaccine. Four series of rabbits were used. The first were given dead virus alone; they shewed neither agglutinins nor immunity. The second were given living virus, but no bile; they shewed high agglutinin titres, but no immunity. The third were given bile and then dead bacteria; they shewed no agglutinins, but a solid immunity. The fourth were given bile and then living bacteria; they shewed agglutination titres of from 0 to 1 in 10,000 and a solid degree of immunity. The agglutinins and immunity results were not parallel in any way. In reply to Dr. Stannus, he did not know how the immunity spread through the skin, but it had been shewn that the virus of vaccinia spreads from the point of inoculation throughout the skin, and he presumed that the same held with the immunity to the staphylococcus.

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Professor Besredka's results are—to put it mildly—very intriguing. If further experimental work confirms his claims, an entirely new and most useful field of therapy will open up. Yet, as the consensus of opinion at the meeting clearly shews, the value of the method will have to be very fully proved before it is universally accepted. Fortunately the League of Nations has taken up the matter on a wide scale.

It is interesting to learn that the method of oral vaccination against dysentery and cholera is being investigated at the Calcutta School of Tropical Medicine and Hygiene.

Oral vaccines against bacillary dysentery are being tested in selected prisons and any who are prepared to co-operate in making a test under controlled conditions are requested to communicate with Capt. Maitra, I.M.S., the special research worker on intestinal infections under the endowment of the Coal Mining Association.

The immense possibilities of oral vaccination in India are obvious, provided of course that the method is found to be successful.

The Treatment of Tuberculous Diseases.

In the course of a very interesting article in the *British Medical Journal* of December 29th, 1923, Dr. Boelke writes:—

"By means of Koch's treatment it is possible to bring about more or less lasting arrest of advanced tuberculous disease. Still, in spite of all these successful results, in some cases Koch's treatment seemed to fail. Some patients did not improve at all, while others, after an initial improvement, seemed to relapse. Beraneck's tuberculin seemed to be somewhat safer and more reliable. Although the injections were painful for a few minutes the absence of big reactions alone made up for this slight inconvenience. In the early stages of tuberculosis of the lungs and in tuberculosis of the other organs of the body the results were far superior to Koch's treatment. In giving Koch's tuberculin test we are working absolutely in the dark. In giving these large, rapidly increasing doses of O. T. it would be surprising if it did not do any harm occasionally.

"Tuberculin treatment, especially Koch's, is a double-edged weapon which should only be handled by men with experience. Such a treatment in which so much

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depends on the reactive powers of the patient, and which, if used carelessly, may sometimes have most deplorable results or which, even if used with the greatest care, may occasionally fail to effect improvement, or which (especially if very large doses are used) may greatly lessen the chances of recovery, is one not lightly to be undertaken."

Sodium Morrhuate.—In the issue of the *British Medical Journal* for February 8th, 1919, Dr. P. W. R. Boelke published a short article on the treatment of tuberculosis by subcutaneous, intramuscular, or intravenous injections of the sodium salts of the unsaturated fatty acids of cod-liver oil after extraction by ether, which Sir L. Rogers called sodium morrhuate.

"We all know the value of cod-liver oil by the mouth in patients suffering from tuberculosis. What at once appealed to me most in connection with this new discovery was the fact that, if successful, the effect of it would not have to depend so much on the reactive powers of a patient, but that it would act directly (as Sir Leonard Rogers suggests) by dissolving the coating of these acid-fast bacilli and thus laying them open to destruction.

"Having started this new treatment from the middle of 1919, and having used it since almost exclusively, I am so much impressed with the results obtained, superior in every way to the other methods used by me in the past, that I would not even withhold it from an almost dying patient."

Then follows a record of numerous striking cases of tuberculosis of various types in which the drug proved of great value. Two cases are recorded to show the value of sodium morrhuate treatment in (so-called) surgical cases, even after tuberculin treatment had failed.

There are numerous patients in the earlier stages of the disease who recovered without much trouble under sodium morrhuate treatment. The cases show:—

1. How valuable a remedy sodium morrhuate treatment is, even in very advanced stages of all kinds of tuberculous trouble.

2. That sodium morrhuate treatment not only gives results equal to those achieved by tuberculin treatments, but it can arrest tuberculous diseases, even where previous tuberculin or sanatorium treatments have failed.

3. That given in correct doses without reactions, it neither inconveniences a patient, as is often the case with Koch's treatment, nor are the injections as painful as in T. Bk. treatment. It is therefore the best method in ambulatory cases.

4. That it is the only reliable remedy in hæmorrhagic or feverish patients.

5. That it is a safe remedy if used correctly, and free from those surprises sometimes following a tuberculin injection.

Even in the earliest stage of active disease, it is sometimes very difficult to work up to a 1 c.c. injection of sodium morrhuate without reactions (thus resembling the high sensitiveness of tuberculous patients to small doses of tuberculin).

The author regards local reactions following sodium morrhuate injections as almost specific. After using sodium morrhuate treatment for about four years the author is so convinced of its efficacy, of its superiority over other treatments, and of its comparative harmlessness, that should a patient (in whom the prognosis was still favourable) fail to improve or to retrogress, she would seriously doubt:—

(1) If the diagnosis has been right. We all know how syphilis, for instance, can closely imitate tuberculosis of the lungs.

(2) If the patient has followed out the instructions. One patient used to celebrate each injection by an extra indulgence in alcohol.

(3) If there are any complications—pneumococcal or streptococcal infections, syphilis, etc. One patient only began to improve after expelling a very large tapeworm.

(4) If the sodium morrhuate was up to standard.

Unless the sodium morrhuate is in good condition and the solution prepared with it perfectly clear, it should be discarded. Unless the drug is perfect the results of this treatment are negative.

In conclusion Dr. Boelke says that after using the various tuberculins, serum (Marmorek's), different colloidal preparations, sugar injections, etc., sodium morrhuate alone has given her the most uniformly successful results. It can be used with confidence and without fear of any unpleasant results. The medical profession should be grateful to Sir Leonard Rogers for placing such a valuable remedy at its disposal.

In a note on Dr. Boelke's method of using sodium morrhuate in tuberculosis, Sir Leonard Rogers writes:—

"I am indebted to Dr. P. W. R. Boelke for kindly sending me a copy of her paper, and regard both the method of administration and the results obtained as of great importance for the following reasons. The first trials of sodium morrhuate reported by me in 1919 established its specific action on tuberculous disease, as shown by febrile reactions with swelling of tuberculous glands, increased discharge from tuberculous sinuses, and occasionally hæmoptysis in lung cases; all effects that may be followed by improvement. Recently I discussed the probable mode of action of the drug. Dr. Boelke's interesting observation of local reactions at the site of subcutaneous injections of the drug in tuberculous cases confirms its specific action on this disease. General reactions may, however, be excessive, for during the past year cases of spread of the disease in the lung, of fresh patches of tuberculous dermatitis, and in one case of apparent generalized tubercle, have followed the use of intravenous doses; so the drug, like tuberculin, is capable of doing harm, and this necessitates great caution in its use, although the very fact that it exerts such definite influence on tuberculous tissues indicates that it may have a beneficial action, if this can only be kept within safe limits.

It is precisely in this direction that promise is afforded by Dr. Boelke's plan of giving small subcutaneous doses of freshly prepared solutions—a point I believe to be of great importance—such doses as do not produce local reactions at the site of injection, which appears in her hands to have eliminated the dangerous general reactions sometimes following the larger intravenous doses formerly advised by me on the basis of their effectiveness against the much less toxic acid-fast bacillus of leprosy. The new method of administration, if confirmed by trials now being carried out by experts in this and other countries, may furnish a safe, simple, and exceedingly cheap method of treating at least a fair proportion of tuberculous cases, although prolonged observations will be necessary before the precise indications for its use can be worked out."

Cancer in Egypt.

A MOST interesting article by Mr. R. V. Dolbey, M.S. (Lond.), F.R.C.S. (Eng.), and Mr. A. W. Mooro, F.R.C.S. (Eng.), in the *Lancet* for the 22nd of March, 1924, gives an analysis of the incidence of cancer in Egypt. The records of all cases—671 in number—observed at the Kasr-el-Ainy Hospital, Cairo, during the past four years were analysed. Conditions in Egypt, habits and customs, dress and clothing, and the incidence of parasitic diseases are utterly different from those in Europe and America. Hence from the point of view of ætiology, a study of the Egyptian cases becomes peculiarly interesting. The Kasrel-Ainy Hospital is the great medical and surgical court of appeal for the whole of the Nile Valley; and in the absence of full statistical evidence, the 671 cases analysed afford as complete an ætiological picture as is possible. The authors' conclusions are as follows:—

1. The incidence of cancer among Negroes is not essentially different from that in Negroid, Negro-Arab, or the Egyptian races.

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2. There is no causal relationship between cancer and parasitic diseases. It appears to be merely the irritation of the parasites and their ova and embryos and the coincident chronic sepsis which is responsible. But the incidence of cancer in relation to bilharzia of the bladder suggests that, only in an alkaline-infected medium such as the stagnant urine of cystitis in bilharzial bladders, does the irritation of ova produce cancerous changes. In the renal pelvis, the ureter, and the intestinal canal the incidence of parasitic disease is almost as great as in the bladder, and yet the development of cancer is almost unknown.

3. There seems to be no connection between cancer of the tongue and syphilis.

4. Malignant disease affecting the bones, the skin, and skin appendages appears to be definitely more common than in Europe or America, and may be attributed, as far as the skin is concerned, to the actinic rays of the sun of Egypt.

5. There is a definite relationship, apparently, between the incidence of gastric ulcer and gastric cancer.

6. There is no relation, presumably, between gall-stones and cancer of the gall-bladder or the gall-bladder fissure of the liver. Nor is typhoid fever, in Egypt, a predisposing factor in the production of gall-stones.

7. The comparative incidence of cancer of the uterus and breast in married and unmarried women does not allow of any statistical conclusions to be drawn, in Egypt, where the vast majority of all women have been married very early, usually some time before 20 years, and have borne children. The comparative absence of non-malignant conditions of the breast, such as fibro-adenoma, and, especially, of chronic interstitial mastitis of the involuting breast, with or without cystic degeneration, is remarkable and inexplicable.

The latter state is looked upon by some pathologists as a pre-cancerous condition; but experience in Egypt seems entirely to negative any relation whatever between chronic interstitial mastitis, which is practically unknown, and cancer of the breast, the incidence of which is probably the same in proportion as in Europe.

8. The progress and development of individual cases of cancer is definitely different in Egypt from that of England or America. The progress is, as a rule, less rapid, the involvement of glands less marked, and the development of metastases more infrequent. There appears also to be a form of epithelioma of the alveolar margin of the jaw that exhibits most unusual features.

9. There appears to be some definite relation between cancer and diet. Simple vegetable foods, the absence of preserved, chilled, or frozen meat of any kind, the lack of jams or fruit preserved in sugar, and the complete avoidance of alcohol in any of its forms seem to be consistent with the non-development of cancer of the intestinal tract. While the adoption of European foods, alcohol, and preservatives by the same people in the cosmopolitan atmosphere of towns definitely appears to be responsible for gastric and duodenal ulcer, gall-stones, appendicitis, and cancer of the digestive tract.

10. The almost complete absence of functional nervous disease among the simple fellaheen, and, indeed, of organic disease of the nervous system also, has a most important bearing on the development of cancer in Egypt. For diet alone will not serve to explain the incidence of cancer. Nor can the use or abuse of alcohol or tobacco be called upon to account for the discrepancy between Egyptian and European cancer. The whole of pagan Africa seems to have learned how to ferment corn as soon as it learnt how to grow it, though the use of alcohol, in the form of native beer or spirit, was usually reserved for ceremonial occasions. But the incidence of cancer appears to be the same in the pagan African from the Southern Sudan as in the non-alcoholic Moslem Arab or Egyptian.

One great and compelling cause for the distribution and incidence of cancer lies in the relative freedom of the fellaheen of Egypt from nervous diseases, functional or organic. This also serves to explain the absence of exophthalmic goitre or cretinism in a country where simple goitre is so common. It also explains many of the other contradictions in the surgery of Egypt. The industrial revolution of the nineteenth century has passed Egypt by. Rural Egypt has hardly changed in 3,000 years. The internal-combustion engine, the bicycle, the sewing machine, electricity, the telephone, the daily paper, the printing press, or wireless telegraphy have not happened as far as the majority of the fellaheen are concerned, for 75 per cent. of them cannot read or write. None of these advances in civilization have altered their lives to any great degree. The only obvious change in the life of the fellaheen in 3,000 years, probably, lies in the substitution of paraffin as an illuminant for the primitive bean oil. There is an absence of financial stress and strain, though there is great poverty. The Egyptian fellah, and he forms 80 per cent. of the population, puts his savings into such objective and solid investments as land and cattle. For him there are few uncertainties in regard to seasons. The Nile flood has taken all worry and anxiety from him in that respect. His buffalo is immune to cattle plague as it is, relatively, to tubercle. To each fellah is his reward according to his toil. Money to him does not represent a source of credit or even a medium of exchange; it is an object in itself to hoard or to bury, but never to lend at usury. Stocks and shares and cotton futures mean nothing to him. So the wear and tear and nervous strain of modern twentieth century life do not affect him. There is very much more, in all probability, than an accidental relationship between the almost complete absence of functional nervous disease and hysteria among the fellaheen and the rarity of abdominal cancer, of symptomatic enteroptosis, of mucous colitis, and the whole train of subjective nervous phenomena which Arbuthnot Lane embraces under the heading of intestinal stasis.

The psychology of Egypt is totally different from that of England or America as a whole. There are no suppressed emotions or complexes in the Near East or the Mediterranean littoral; no need for psycho-analysis. In the presence of death, grief is overwhelming. Mourners tear their clothes and hair, wring their hands, and express their sense of loss in torrents of tears. Fear expresses itself in terms of panic-stricken flight, religion in wild-eyed frenzy and fanaticism on occasion. There is no reserve, no disciplined dry-eyed suffering, though there is a fine dignity in the Orient; no stoicism, though there is an admirable endurance of pain. There are no gastric invalids in Egypt, no nervous dyspepsias, no hypochondriacs, no valetudinarians, except among the student and leisured classes; and that is perhaps why there is comparatively no gastric ulcer, no gall-stones, no appendicitis, and no gastric cancer.

The Adenoid Child.

A VERY interesting discussion on this subject is that contributed to the January 1924 issue of the *Quarterly Journal of Medicine* by Drs. Lucy Wills and Joan Warwick. An analysis of the clinical findings and of the histological appearances of the adenoids removed leads these workers to the conclusion that there are two groups of adenoid children:—(1) those suffering from simple inflammation of the naso-pharynx; and (2) those with true hypertrophy of the adenoid tissue; which can, in the majority of cases, be distinguished clinically. In the first the symptoms are local,—apart from such general reactions to sepsis as fever, etc.; the body type and posture are normal, and examination of sections of the adenoid tissue shews an increase in the number of small lymphocytes and plasma cells,—the ordinary response of lymphoid tissue to local sepsis. In the second group, the symptoms are vague, but the posture is affected. The long axis of the body is tilted; the shoulders and the upper part of the trunk are thrown backwards, the curves of anterior and posterior outlines of the body are less flat than normal. In certain cases the lordosis is very marked. (3) A perpendicular through the middle

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of the external malleolus passes behind the most anterior point on the dorsal curve. (4) The lordotic angle is less obtuse. (5) The maximum belly is generally well below the level of the maximum lordosis; in fact a pendulous belly is characteristic of this group. (6) The group, as a whole, appears to have a lack of muscle-tone; the child is hypotonic. The authors consider that the "adenoid deformities of the chest" described in the text-books,—knock-knees, bowed tibiæ, bossed head—are the result of rickets and not of adenoids. Even obstructed nasal breathing could scarcely produce these deformities without an accompanying softening of the bones. One authority,—Biaggi,—found that 90 per cent. of the inmates in an institute for rickety children had adenoids.

The so-called "adenoid facies" may be due to nasal obstruction from other causes,—hypertrophied turbinals, chronic nasal catarrh, etc.,—and not to adenoids at all.

With regard to histological findings, the first group shew simply the presence of lymphoid inflammation. In the second the fundamental change is hypertrophy of the endothelial elements, with no increase, and possibly a decrease in the small lymphocytes in uncomplicated cases. The associated clinical symptoms suggest some general, constitutional cause.

The Uses and Limits of Vaccine Therapy.

AN exceedingly interesting discussion on this subject took place at a joint meeting of the sections of medicine, pathology, and of therapeutics and pharmacology of the Royal Society of Medicine in London on January the 8th, 1924, and is recorded in the *Transactions* of the Society for April, 1924.

In opening the discussion, Sir Almroth Wright said that direct inference as to whether a dose of a standardised vaccine did or did not do good was practically not available, since factors varied in individual cases, and nothing less than a complete immunological picture of the patient's condition before and after treatment would afford true evidence. We were, therefore, compelled to fall back upon indirect evidence,—as was the case with those who first sailed round the world, and in the demonstration by Pasteur and Einstein of the truth of their discoveries. He then proceeded to discuss the facts bearing on immunisation, the deductions to be drawn, and the theories which were concerned. In the matter of dosage, whilst a healthy man might stand a large dose prophylactically, a person infected with the same organism might not, and it was, therefore, necessary to determine the dimensions of his infection in order that his dose might be proportionate. If the infection had increased to such a stage that the patient was receiving all or more than the dose of toxins which he could stand, then the indication was, not for vaccine therapy, but for passive immunisation with anti-sera. Immuno-transfusion of the blood of an immunised donor had its limitations, since the amount of protective substances present in the volume of blood removed from the donor and given to the infected patient was limited. There was not inconsiderable evidence that inoculation with one species of microbe might protect against other species,—a doctrine difficult perhaps for some to accept. Yet in the case of immuno-transfusion,—(i.e., the transfusion of the patient with the blood of a person immunised against the infection in question, a process to-day widely in use in the London hospitals),—antibodies might be present in the donor's blood within a few minutes of inoculating him with the protective vaccine. Such antibodies were obviously not created within that time, they must have pre-existed in his blood and have been freed by the injection. The ten-day interval after inoculation which intervened before specific antibodies were produced indicated that such antibodies were of more than one class. In prophylaxis, specific antibodies were more important than non-specific ones, in treatment the reverse was the case; thus the crisis in pneumonia might be due to an accumulation of microbes reaching a critical dose and causing active immunisation, and possibly a dose of vaccine on the first or second day of the disease might cut short the attack. In chronic tuberculosis, on the other hand, multiplication of the bacilli was slow, and here possibly passive immunisation would prove to be the best line of therapy. He doubted the value of statistics as a means of judging the results of treatment by vaccine therapy; "the demand for statistics was bad, especially when coming from an intellectual profession."

Sir William Leishman pointed out how much the therapeutic use of vaccines owed to their widespread use in prophylaxis, and instanced the mild character of attacks of enteric fever and of influenza in the inoculated. Of methods of preparing vaccines there was to-day no end and high claims had been made in turn for sensitised vaccines, sero-vaccines, lipo-vaccines, detoxicated vaccines, diaplyte vaccines and others. All modifications had the same end in view,—to procure an antigen as free as possible from toxic elements but still with full protective power. Personally, whilst admitting that improvements might be possible, he did not feel convinced that any of these numerous modifications gave better results than simple sterilisation by heat or perhaps by an antiseptic agent; whilst—despite Besredka's brilliant work on oral vaccination—he still favoured the subcutaneous route.

With regard to autogenous as against stock vaccines, he had observed but little evidence of the superiority of the former. Stock vaccines were chosen for the superior antigenic powers of the strains isolated and might prove more potent.

Dr. William Gordon commented on dosage with streptococcal vaccines; the doses usually employed were far too high, and he cited cases where an initial small and beneficial dose had been followed by larger doses with very severe results and—in some instances—syncope. With small doses, such as 40,000 organisms, repeated every four days, better results were obtained, whereas a dose of 250,000 or half a million might produce harm.

Dr. A. P. Beddard said that with regard to vaccines used prophylactically, the case for anti-enteric vaccines might be regarded as proved. With regard to anti-catarrhal vaccines, one saw good results, and one saw failures. The more nearly the patient was a chronic carrier, the more difficult was it to get any good result at all.

In general he advocated beginning with small doses of mixed catarrhal vaccines in such persons, more by way of treatment than of prophylaxis, and going cautiously. Another prophylactic use of vaccines was the attempt to render a patient about to be submitted to a surgical operation, e.g., on septic tonsils or other septic area,—resistant to spread of the infection after operation. It took some three months to work up the necessary degree of resistance.

As regards vaccines used for curative purposes, in acute infections with high temperatures and grave constitutional disturbances the use of vaccines was limited. They might be used at the commencement of the attack to try to abort the disease,—a very successful case being that of a doctor's wife who had a series of attacks of streptococcal pneumonia, where an injection of 200,000 million organisms in an autogenous vaccine, followed twelve hours later by double that dose aborted the attacks. They might be tried before the constitutional disurbance set in, or when it was passing off, yet their rôle was a limited one.

In less acute cases,—e.g., low grade septicæmias such as gonorrhœal arthritis and recurrent venous thrombosis,—the patient was curing himself, but vaccines were a valuable aid. In chronic cases the limitations of vaccine therapy must have struck everyone. Chronic joint infections and chronic infections of the urinary tract with *B. coli* were apt to prove intractable to vaccine therapy. Secondly, infections of the various tubes of the body, such as the alimentary tract, the Fallopian tubes, the urethra and ureters were not readily amenable to treatment. As regards different types of vaccines, he had nearly always used autogenous vaccines when available.

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Some patients might prove hypersensitive, and in these the use of a stock or sensitised vaccine or of very minute doses intravenously might get over the difficulty. There were many avoidable failures in vaccine therapy. Thus the organism selected for vaccine production might only be a secondary invader; the dose interval might be erroneous, and here the principle to be followed should be to try to avoid reactions; the treatment might not be persisted with long enough; and—finally—there might be mechanical defects which had not been realised, the necessity to drain sinuses, antra, and the like.

Dr. Norman McCaskie spoke from the point of view of the general practitioner. On the whole he had had good results in immunising patients against autumn and winter colds with mixed catarrhal vaccines. Sometimes the immunity was complete, in other instances partial—the patients contracting fewer colds during the season than usual and recovering more rapidly. In fact the immunity conferred seemed to be definitely greater than that from the disease itself. In chronic infective arthritis vaccines were of value, provided that other local and general treatment was combined. Also vaccines were of use in *B. coli* infections of the urinary tract, after the first acute symptoms were over, and in staphylococcal infections; but they were of little value in chronic bronchitis and in nasal infections and in gonorrhœal complications. Faith, hope and psychic factors were often concerned, and the method was liable to abuses.

Dr. Richard Armstrong gave the results of a year's work on the immunity responses in rabbits inoculated with the "raw" type 2 pneumococcus vaccine. He had found briefly that sensitised vaccine, given intravenously, produced an immediate immunising effect which was exhausted in 24 hours. A slight rise in immunity then followed about the 2nd or 3rd day, to be succeeded by a marked rise in antibody content about the 6th day and later. When given subcutaneously the sensitised vaccine shed its antibody charge within the first 24 hours and exerted a passive immunity which only developed after the first 24 hours. Subsequently there was a low grade of immunity for about three days, then on the sixth day and subsequently a high grade of immunity. The culmination of the immunising effect of vaccines on the sixth day appeared to furnish a clue to the occurrence of crisis in lobar pneumonia on the sixth or seventh day of illness. Clinically, the use of repeated doses of sensitised pneumococcus vaccine is actually likely to produce deferment of the desired protection of the patient. A single large dose of sensitised vaccine early in the disease appeared to be indicated. It appeared that in reality we were but at the beginning of a full understanding of the rationale of vaccine therapy, and had but an incomplete understanding of the mechanism of immunity response.

The New Regulations for the D. P. H.

Brit. Med. Jl., December 29, 1923.

THE new regulations of the General Medical Council for the Diploma in Public Health apply from January 1, 1924. Under the old rules candidates for the diploma might enter upon the stated curriculum at any time after obtaining a registrable qualification in medicine and surgery. It was required that the curriculum should last not less than nine calendar months, and should include four months' stay in a laboratory, six months' practical study of the duties involved by public health administration, and attendance at least twice weekly for three months on the practice of a hospital for infectious diseases. The new rules require that a period of not less than two years should elapse after obtaining a registrable qualification before admission to the final examination for a public health diploma. The curriculum must extend over not less than twelve calendar months; at least five months must be given to practical laboratory instruction in bacteriology and parasitology, in chemistry and physics, in relation to public health, and in meteorology and climatology. The regulations as to attendance at a hospital for infectious diseases are made somewhat more stringent. Further, the candidate must have six months' practical training under a medical officer of health, and the time cannot be reduced by attendance on lectures, as under the old regulations. The practical training must include maternity and child welfare, the services relating to school life, venereal disease and tuberculosis, industrial hygiene, and food, meat, and milk inspection. The examination will consist of two parts. The first will cover bacteriology and parasitology (with medical entomology), chemistry, physics, meterology, and climatology. The second part includes hygiene and sanitation, epidemiology and infectious diseases, sanitary laws and vital statistics, and public health administration. There will be practical examinations in infectious diseases, food inspection, and inspection of premises. Neither part of the examination can be entered on until the relative courses of instruction (after registration in medicine) have been completed, and Part I must be passed before admission to Part II.

Medico-Legal Pitfalls.

By SIR JOHN COLLIE, M.D., C.M.G., J.P.

THE following are a few extracts from a fascinating article in the *Practitioner* of February, 1924.

"Your report should be written in plain English and in business-like language. Technical terms should be put in brackets, but only after their everyday synonym has been used.

When making a medico-legal examination, always make an accurate record at the time of the results of tests applied, for your statements will certainly be tested in the witness-box. Preserve your original notes and take them with you to court. Cross-examining counsel may ask 'Were these notes made at the time?' In a difficult case take full notes, but postpone writing your report until you have carefully thought the matter over.

Never be ashamed of changing your mind; it only shows you are getting wiser as you get older. But it is not good business to change your view after you have committed yourself to paper in a medico-legal report.

Only facts—bare, stubborn, and incontrovertible—pass muster in the courts. Moral certainties, like moral victories, rightly count for nothing. Always be prepared with the exact data on which your opinion is based. When writing your report and giving your conclusions, never allow your sympathies to carry you away. When tempted to give a certificate—any certificate, not only a medico-legal one—based on sympathy, be adamant.

The medical man may quite safely express with utmost freedom his honest opinion, if it is given exclusively to those entitled to it. You may write privately to any individual saying exactly what you think of him; but you must not show it to anyone, i.e., technically 'publish' it. If you neglect to mark you letter 'private' and you know, or ought to have known, that the recipient keeps a secretary who opens his letters, or you dictate it to your secretary, you are asking for trouble. Do not be surprised if, in court, it is openly insinuated that you are fundamentally ignorant of the most elementary facts of your profession. If you do much medico-legal work, you will get used to it, as one does to an ugly wall-paper, or the crazy daubs of the post-impressionists and cubists.

Never get angry in the witness-box. Councel are often very provoking, sometimes intentionally so; thwart them by keeping calm.

Never be afraid of admitting in court that you are not omniscient. Tell counsel, with much apparent candour, that you are not a specialist, that a specialist is one who is supposed to know everything about something, whereas you have all along aimed at knowing something about everything.

Suggestion is simply the art of getting an idea into someone else's head without his knowing that you are doing it. You all do it every day, by your manner,

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your facial expression, the mode of your address, by your self-confidence and even by your clothes.

Did you ever know success in practice attend a shabbily-dressed, retiring, diffident, self-conscious or gloomy doctor, one who is qualifying to leave behind him a testamentary document similar to that of Rabelais, which read, 'I have nothing, I owe much, the rest I leave to the poor.'

Functional nerve disease is the result of a combination of reality and unreality. Everything is in good working order; nothing is absent, save the capacity to switch on the motor power. This is your duty.

Remember when a person persists in saying he is ill, that he may be so, although you cannot discover the cause of his complaints. The real trouble may be your want of experience. An inexperienced house-surgeon, in answer to his chief's cheery inquiry, on entering the ward, as to how the patients were, replied:—'All very well, sir, except the malingerer, who died last night'."

Experiments on the Ætiology of Chronic Infection of the Spleen.

By ALEXANDER GEORGE GIBSON,

Pathological Laboratory, Radcliffe Infirmary, Oxford. Quarterly Journal of Medicine, January, 1924, p. 191.

THE experienced physician in India realises that malaria, kala-azar, leukæmia, tuberculosis and syphilis, taken together, do not account for all cases of splenic enlargement encountered. There is always a small group of residual cases of splenomegaly, which defy attempts at determining their ætiology. A few may be due to splenic aneurism, others to abscess of the spleen—whether of amœbic, septic or apparently purely necrotic origin. Hence a paper on the above subject may be of interest.

The spleen in question was removed by surgical measures from a patient suffering from splenomegaly and fever, and sent to the author by Mr. Harold Upcott of Hull. The patient had suffered from repeated attacks of jaundice and from what was thought to be gall-stone colic. Cultures from the freshly removed spleen gave a growth of a streptothrix of actinomycosis type, growing in broth in spherical, fluffy, snowball-like masses, and on agar in whitish circular colonies which stick to the medium and have to be dug out. The organism is Gram-negative, and produces a whitish powdery efflorescence on the summit of the cultures.

Ten monkeys were inoculated with pure cultures of this streptothrix. Two other non-inoculated controls shewed no symptoms, were post-mortemed after the same periods as the inoculated animals and shewed no lesions. In three of the injected monkeys there was gradual wasting, debility, a tendency to œdema, and progressive enlargement of the spleen and liver. These died and post-mortem examination shewed the cause of death to be disseminated caseous tuberculosis,—a very common cause of death in all experimental monkeys.

The third group comprised seven injected animals. In these there was progressive debility. They shewed marked abdominal tenderness, muscular weakness and in some nervous system symptoms. On post-mortem examination all shewed fibrosis of the spleen and one an enlarged spleen. The livers of two shewed infarcts and in one a healed scar. In two there was ulceration of the stomach and in one cerebral softening, atrophy and scarring over the left parietal and temporal lobes. Histological examination of the diseased tissues shewed the same streptothrix present in very scanty numbers. In four of the infected animals the same streptothrix was isolated in culture, either from the blood during life, or from the diseased tissues after death. Koch's postulates having thus been proved, streptothrix infection must now be added to the list of possible causative agents of splenomegaly with fever.

In India, where spleen puncture on cases of doubtful ætiology is so frequently carried out, it should not be difficult to detect this condition, if it is at all frequent.

Slow Lactose-Fermentors.

EVERY laboratory worker in the tropics must have been puzzled at times by the occurrence upon his MacConkey plates of late lactose-fermenting bacilli, and in this connection two papers in the March 1924 issue of the *Journal of Hygiene* are of interest.

The first is by Dr. J. Bamforth, M.D., D.P.H., Assistant Bacteriologist, St. Thomas's Hospital, and deals with a small outbreak of dysentery among the nursing staff of an institution. In all there were six cases, only one of which was of great severity. All were febrile, and shewed blood and mucus in the stools. Clinically they resembled mild cases of Flexner dysentery. The fæces of four were plated on litmus-lactose agar, prepared with chemically pure lactose. A Gram-negative, non-motile bacillus was obtained from three of these four cases, which shewed the involution forms so commonly seen with members of the coli-typhoid group, and giving blue colonies on the plate. Acid was formed in 24 hours in glucose, mannite and maltose and remained constant for ten days. In saccharose acid was formed on the 4th day, and in lactose on the 7th day. Inulin and salicin were rendered alkaline, and milk acidified. No gas was formed in any of these media. Only a trace of indol formation was to be detected, the organism is non-hæmolytic and does not liquefy gelatine in 14 days.

Rabbits were inoculated with increasing doses of 24-hour old live agar cultures, and high-titre sera obtained which gave agglutinations at 1 in 1,000 and 1 in 2,000 dilutions. These sera shewed only traces of agglutination to typhoid, Shiga and Flexner bacilli. The author comments upon the resemblances of this organism to other para-dysentery bacilli described in the literature,—especially to one described by Sonne in connection with dysentery in Scandinavia. "It would appear that, in the investigation of cases of diarrhœa and dysentery, organisms of the slow lactose-fermenting type are worthy of attention."

The second paper is one by Dr. L. S. Dudgeon, C.M.G., C.B.E., F.R.C.P. (Lond.), Professor of Pathology, University of London, and also to St. Thomas's Hospital. The author has met with no less than 49 cases of infection of the urinary tract in less than two years with bacilli of slow lactose-fermenting type. All ran an acute course,—in some instances with prolonged fever, and in some with a clinical diagnosis of enteric fever. Some occurred in women recently confined, and the lochia yielded the same organism on culture. The urinary symptoms are, indeed, masked by the severity of the general reaction.

When the urine of such cases is plated on litmus-lactose agar, the colonies for the first 48 hours resemble those of the enterica group, but subsequently some strains acquired colonies with a greenish-blue colour after a few days' incubation at 37°C. and shewed a reddish tinge by transmitted light. All the 49 strains isolated produced marked hæmolysis of human red blood corpuscles. They were Gram-negative, motile, formed acid and gas in mannite, dextrose, maltose and dulcite, although dulcite was subsequently rendered alkaline by some strains. Milk was acidified, and clotting occurred with most of the strains in 72 hours, but with three strains milk became definitely alkaline and no clotting occurred. Lactose-lemco-broth was acidified during the first 24 hours by some of the strains and then became alkaline. Some did not form gas, while some fermented lactose to a slight degree in 72 hours. Cane-sugar was rendered alkaline with every strain in 48 hours; a good growth was obtained on gelatine, but this medium was not liquefied.

Rabbits were immunised with living cultures and with vaccines of this organism, and high titre sera obtained. Every one of the 49 strains agglutinated with the three anti-sera employed, but no reaction occurred with T.A.B.C. sera. The agglutination results point to these

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organisms as one group of bacilli. The organism was not cultivated from the blood stream or fæces of the acute cases; but—on the other hand—the cases proved very sensitive to specific vaccine therapy. As compared with ordinary acute *B. coli* infections of the urinary tract, the infection is much less common, more severe, and persists for a longer period, but ultimate complete recovery and freedom from infection is much more probable.

It is clear that in both papers we have contributions of considerable value to the very difficult problem of delayed lactose-fermentors. The two organisms are clearly different from one another, as also from any of the established and known bacteria of the group. The authoritative position of both workers lends an added value to their reports. The coli-typhoid group is already a very complicated one, but it is only by such research work that its difficulties can be cleared up.

Reviews.

KALA-AZAR IN ASSAM. AN ACCOUNT OF THE PREVENTIVE OPERATIONS, 1910—1923.—By Lt.-Col. T. C. McCombie Young, M.D., D.P.H., I.M.S., Late Director of Public Health, Assam. London: H. K. Lewis & Co., 1924, pp. 76; Plates 4 and Charts 7. Price 7s. net or Rs. 5. Obtainable from Messrs. Butterworth & Co., P. O. Box 251, Calcutta.

THERE is one matter at least upon which the public health organisation of India can claim that it has earned merit, and that is the fine campaign waged incessantly against the ravages of kala-azar by the Assam administration for the past 14 years. Here there has been none of that parsimonious cheesparing, so dear to the finance departments of governments, and so fatal to all real attempts to improve the public health; none of the old time story of enormous preventable epidemics left to kill off millions because those in authority consider that funds are not available to take the necessary steps to prevent them. On the other hand the campaign has been strenuous, well planned, and—in a large measure—successful. And in this exceedingly interesting volume, Colonel McCombie Young, who himself helped to originate that campaign and was for many years its directing general, tells the story of the long struggle in a modest and eminently readable style. We trust that this book will have a wide sale in India, for the campaign itself is a model that other provinces might do well to follow or imitate in connection with other epidemic, but preventable diseases.

In a foreword to the book, Sir Leonard Rogers writes that the book "adds a most important chapter to the long history of kala-azar, and records gratifying progress in dealing with the scourge. . . . . The serious recrudescence of the disease, closely following the influenza epidemic of 1918–1919, was controlled sufficiently in the newly infected Sibsagar district to prevent its producing the devastating effects of its former prevalence in Nowgong, while its spread has been limited to barely ten miles in five years, or about one-fifth of its former rate . . . . Thanks to the splendid organisation of the Sanitary Department under the author, it has enabled upwards of 80,000 infected persons to be treated for several months on end by intravenous injections of a highly toxic drug, in the numerous remote villages of Assam, of which a fascinating description is given. . . . . The saving in revenue in two decades through the lowered death-rate, clearly indicated in the author's diagrams, will amount to about three times the actual expenditure on the measures undertaken." Will authorities in finance departments please note? An opinion on such a matter given by one of such distinction as Sir Leonard Rogers, is not to be passed over lightly; well organised campaigns against preventable epidemic diseases *pay* the cost of running them several times over in increased revenue; whilst, from the sanitarian's point of view, they are invaluable in arousing a "sanitary conscience" among the people. There may have been some opposition once to the anti-kala-azar measures in Assam; there is none now; the people welcome the staff of workers everywhere; indeed during 1922, when the non-co-operation movement reached its height and Europeans and officials were being molested, Colonel Young and his staff moved freely about the disaffected districts without let or hindrance. He was the "burra kala-azar doctor sahib."

The author takes up the story of kala-azar in Assam at the point where Sir Leonard Rogers' study of it left it in his Milroy lectures, included in the first edition of his "Fevers in the Tropics," and his first study is that of the quiescent phase, following on the great epidemics in the Assam Valley of 1880–1890 and 1890–1900. The reader's attention is at once arrested by the importance of *secondary* factors which tend to reduce individual resistance in connection with its epidemiology. Thus the first great epidemic followed the great earthquake; the most recent recrudescence of 1918–1919 followed the influenza pandemic, which lowered the vitality of the people. The survey in 1912–1913 "shewed that certain endemic areas had persisted as still glowing embers in the old track of the epidemic fires. . . . . the disease was quiescent, and showing no signs of dangerous movement, although in the Golaghat sub-division its presence on the fringe of previously uninfected territory was regarded with suspicion."

The influence of kala-azar on the growth of population is next dealt with, and it is shewn how in some instances, where census returns shewed a suspicious decline or abnormal absence of natural increase in the population, a subsequent kala-azar survey shewed the existence of an unsuspectedly wide area of infection; thus at the instance of the Minister, Habiganj, which had shewn depopulation in the census returns, was surveyed in 1922, and some 2,500 cases were found, with 600 villages infected in this area,—an area which had previously been regarded as only lightly infected. Here again is a lesson of importance for public health workers in connection with other epidemic diseases.

Chapter 3 deals with the fever epidemics in Bengal and the antecedents of the Assam epidemic of the eighties and nineties, and again illustrates the importance of secondary factors which tend to lower vitality in awakening the course of the disease into full epidemic virulence. Then follows a general account of the measures in vogue during the quiescent period of 1912–1917, followed by the discovery early in 1917 that the disease had flared up in Golaghat, and that the province might be faced with a repetition of its terrible experiences during the Nowgong epidemic. The position was critical; even to-day we are still ignorant of how the disease spreads, whilst the antimony treatment was still in its experimental phases; yet measures were urgently called for. The disease was made compulsorily notifiable, and a survey started;—chapter 5 giving an account of the preventive operations undertaken in Sibsagar, and illustrated with many well executed and interesting photographs. The author's style is restrained throughout, but some of his pictures of the pre-treatment days make terrible reading; village after village in ruins and deserted; the slow extinction of *all* the members of family after family; "in a cattle shed lay a young woman, inconceivably emaciated and unable to move, surrounded by heaps of her own excreta, and at her breast a starving infant, also infected";—two members of a family of seven, all infected and all doomed to death. *That* was what kala-azar used to be like in the old pre-treatment days

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before intravenous antimony was introduced and kala-azar became almost a fashionable disease.

The antimony treatment, first introduced by the Italian workers, was introduced into Indian practice by Sir Leonard Rogers, and its first clinical trials were made by him, by Muir, Dodds-Price and Foster. It was obvious, however, that experimental work was necessary to determine dosage, the quantity needed to cure, the best methods of treatment, etc., and a small hospital was built by the Department in 1917 at the then newly opened Pasteur Institute at Shillong under Knowles, where full laboratory facilities for tests were available. The first few reluctant patients had to be compelled or cajoled to come for treatment, but their reappearance in their villages, cured, well and happy caused a complete change of public opinion. The Shillong experimental hospital had been preceded just before by the opening of the hospital at Nazira, in Sibsagar, and in six months' time matters were so far advanced that equipment boxes were designed and men sent to Shillong and Nazira for training in the injection technique.

The introduction of the antimony treatment effected a revolution in the measures taken against the disease. An equipment pannier was designed by Major G. Taylor, I.M.S., full details of which are given in an appendix. Messrs. Burroughs & Wellcome introduced a suitable "tabloid" of sodium antimony tartrate, and compulsory treatment was introduced throughout the epidemic areas, together with further survey work; the whole organisation being rapidly expanded, and no expense spared. To-day the only measures of compulsion necessary are to get the patients to continue treatment until cure is perfectly certain.

Knowles having suggested in 1920 that treatment of the first few early cases in a village might possibly eradicate the focus of infection and be of value as a *preventive* measure, special efforts along this line were made, and the results are analysed in chapter 7. On the whole, one must confess that these hopes have not been realised; yet the author is able to write that "the results are encouraging. The figures suggest that early treatment of the first one or two cases *does* control an outbreak. In some cases, it appears to extinguish it entirely . . . . in practically all cases it seemed to prevent the outbreak assuming epidemic proportions." The answer to this enquiry is of real importance from the epidemiological point of view; since if treatment of the first one or two cases in an area entirely eradicates the disease, we must regard *L. donovani* as essentially a parasite of man; whereas, if it fails to do so, we may be driven to the conclusion that it is essentially not a parasite of man, and that man is only secondarily infected.

Chapter 8 deals with clinical types of the disease and the preventive measures taken on tea estates, and chapter 9 with the season of onset of kala-azar, an article expanded on that published by the author in this journal in 1923. The season of onset in Sibsagar and Nowgong appears to be markedly and statistically different from that in Sylhet.

In chapter 10, on the distribution of kala-azar in Assam and in India, with reference to temperature and humidity, the author makes a real contribution to our knowledge of the epidemiology of the disease. For transmission of kala-azar to occur, three factors appear to be necessary, according to the author:—

(*a*) A considerable degree of humidity; not less than is indicated by an annual mean relative humidity of 60 per cent.

(*b*) A monthly mean minimum relative humidity which is not at any time less than 40 to 50 per cent.

(*c*) A mean monthly minimum temperature not falling lower than 50 degrees F.

Chapter 10 deals with statistics, and shews the general efficacy of the measures taken; the response of endemic kala-azar to the prevalence of other epidemic diseases; and bears out the contention that, had it not been for the vigorous measures undertaken, the present outbreak might have devasted the infected areas in the way that the outbreaks of the eighties and nineties did. If a saving of at least 80,000 lives in five years is anything to be proud of, the author and the Assam administration may place this to their credit. Finally comes a short, non-speculative chapter on the transmission problem, and appendices on the legal powers enacted to control the epidemic, the aldehyde test, and the contents of the portable kala-azar pannier.

If we have dealt at some length with Colonel McCombie Young's admirable book, it is because of the importance of the lessons which it teaches to public health workers in India. Its price is so studiously moderate for so well got up and well written and interesting a volume, that we trust that it will have a wide circulation. For its interest should extend beyond the infected districts; there is here a well set out account of how one province in India has grappled with and held in check a preventable, epidemic disease which was threatening to devastate the province. The mystery of kala-azar transmission is not yet solved; but, in spite of this, working in the half-dark, the measures have been largely successful. What could not be accomplished were similar campaigns on a similar scale to be undertaken in other provinces in India against preventable and epidemic diseases, where everything is known about their modes of transmission? If any philanthropist is anxious to do something to assist the overburdened public health workers in India, we suggest that he should send a copy of Colonel McCombie Young's most interesting book (together with a marked copy of this review) to every official in the land who has anything to do with the apportioning of public revenues and the drafting of budgets!

R. K.

HISTORY OF THE GREAT WAR. MEDICAL SERVICES. GENERAL HISTORY. VOL. III.—By Major General Sir W. G. Macpherson, K.C.M.G., C.B. London: H. M. Stationery Office, 1924. 556 pp. Price 21s. net. Obtainable from Messrs. Thacker, Spink & Co., Calcutta and Simla.

THIS volume covers the history of the medical services during the operations on the Western front in 1916, 1917 and 1918; those in Italy; and those in Egypt and Palestine. It is an exceedingly interesting volume, ably written and profusely illustrated with maps and photographs, and will appeal not only to the administrative medical officer, but also to all medical officers who served in these areas during the war.

The first 326 pages deal with the western front and contain very interesting photographs of field ambulances, dressing stations, and dug outs,—many of them supplied by Captain R. T. Bruce, who served with the 51st (Highland) Division field ambulance. By 1916 the front had become almost stationary, and the casualty clearing stations tended to become more and more elaborate, many of them supplied with surgical teams and doing advanced surgical work. In many ways this made for greatly improved results. On the other hand the arrangements for clearing the wounded back to the base were less advanced; thus during the fighting on the Somme on July 1st|2nd, 1916, the congestion in the casualty clearing stations was acute; partly because the wounded were collected by the field ambulances more quickly than had been anticipated, partly because of the failure of ambulance trains to arrive. It became clear that much closer liasion between the medical and transport services was necessary, and this was brought about. The figures given are on an almost colossal scale; between the 1st July and 30th November the field ambulances of the Third, Fourth and Fifth Armies cleared 316,073 wounded, as well as many thousands of enemy wounded also. During the battle of Arras in 1917 a specially difficult strategic problem had to be faced; all traffic had to pass through Arras itself and it was anticipated that the congestion on the two roads concerned would be such that the wounded could

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not be evacuated to the casualty clearing stations during the first 36 hours of the battle. Advanced dressing stations were accordingly opened close to the front line; one of the most interesting being "Thompson's Cave"—a large subterranean cave from which stone had been excavated during the building of the city in the 16th century. It was fitted up with a piped water supply and electric light, and could accommodate 700 wounded on stretchers and was within 800 yards of the front line trenches. The fighting in general being of a very severe character, but on a narrow front, arrangements had to be made for pooling motor ambulances, lending personnel and equipment and for a general elasticity in the medical services. It was during this fighting and the cavalry advance to Monchy-le-Preux that the "pack-mounted section" of the cavalry field ambulances was designed.

Chapters 6 to 11 deal with the battles of Ypres in 1917, the Dunkirk—Nieuport area and the Cambrai operations in 1917. Throughout there are admirable maps and plans shewing the methods of collection and of evacuation of the wounded. Chapters 12 to 15 deal with the German offensives in 1918, and here there is an important lesson to be learnt. With almost stationary trench warfare, the casualty clearing stations had almost developed into main hospitals and had lost much of their mobility. Consequently when ground was yielded under pressure, the very greatest difficulty was experienced in clearing them of wounded and evacuating them back in time to escape capture by the enemy. Thus the D.G.M.S. issued the following memorandum in connection with the German offensive on the Lys,—one which is most instructive and important:—

"The experience of the last ten days of March demonstrates the paramount importance of medical units maintaining their mobility in the field.

"Trench warfare and the desire to carry on surgical work to the highest degree of perfection have led casualty clearing stations to become large and immobile units, pushed as far forward as possible, thus diminishing the tactical importance of maintaining mobile dressing stations at intermediate positions. The consequence of this has been that in certain areas casualty clearing stations have had to abandon valuable equipment in retiring, that in some instances no main dressing stations had been opened in their place for the reception of wounded, and that the motor ambulance cars of the field ambulances have been employed in carrying the wounded back to casualty clearing stations to the new positions of the latter farther back. In consequence of the time lost in returning from these, the field ambulance cars have not been able to arrive in time to remove lying-down cases collected at the collecting posts by the bearer divisions, and many wounded unable to walk have been abandoned.

"Attention is therefore directed to the importance of arranging that when casualty clearing stations are situated far back from the front line, as they ought to be in the present military situation, intermediate main dressing stations, which can be moved rapidly in echelon backwards or forwards as required, shall be established by divisions or corps."

Finally came the advance to victory, and with it new problems. The number of casualty clearing stations was adequate,—even for the earlier and severe fighting; but as the rapidity of the advance increased, and especially with the advance of the Second Army across the devastated areas of the Ypres-Armentieres sector to the large towns of France and Belgium beyond, railheads could not be pushed forward fast enough to keep touch with the advance, and the question arose whether it was better to push the casualty clearing stations on in advance of the railheads, or to retain them at railheads and bring the wounded back by one long journey by car; as a rule the latter policy was adopted. In addition to the needs of the British armies, large numbers of enemy wounded and sick had to be catered for, also provision made for the civilian population and released prisoners of war, whilst the outbreak of the influenza pandemic rendered the situation more difficult than ever. The chief problems of this phase were those of transport.

Chapter 18 deals with the medical services in Italy, and here the most interesting feature is the description of the efficiency with which the long Mediterranean line of communication worked. The ordinary journey from Taranto to Cherbourg took two or three days, but the ambulance trains carrying the sick and wounded from the Eastern theatres of war ran through much more quickly and expeditiously. Throughout the Italian operations generally, malaria was a special factor to be combated, whilst Taranto grew into an important centre with hospital accommodation for over 1,100 British and camp accommodation for some 10,000 troops and labour corps. One of the features of the fighting in the Asiago plateau was that for work on the mountain roads, the Italian Fiat cars were found to be much better than the Ford cars with which the ambulances were originally equipped.

Chapters 19 to 22 deal with the medical services in Egypt and Palestine. Here there is much interesting matter. The growth of Alexandria into a large hospital base for the Gallipoli operations is described. There appear to have been very great difficulties; thus the D.M.S. Egypt was always in the dark as to the strength of the troops in the peninsula and the numbers of sick and wounded to be accommodated; he endeavoured to keep 10,000 beds always vacant for casualties from Gallipoli, but during August 1915, no less than 32 transports and hospital ships arrived with 20,500 sick and wounded. Egypt, in fact, occupied a pivotal position in the whole of the world war. In addition to the minor operations in the desert on her western frontier,—the medical arrangements for which are well described in chapter 20,—the organisation of the Palestine advance, and the use of Alexandria as a base for the Gallipoli operations, the country was an intermediate base for troops passing through to and from the theatres of war in Europe, Asia and East Africa. The hospital accommodation for troops in Egypt accordingly rose from 5,400 in 1914 to over 36,000 in 1916.

Perhaps the most interesting point in these chapters is the account of the different methods of transport employed for the wounded; during the operations against the Senussi camel cacolets were brought into use, whilst the regular motor ambulances proved useless for work on the desert roads, and were replaced by Ford cars with light ambulance bodies. Sand carts drawn by mules were used in these operations, as also in Sinai and Palestine.

The last two chapters deal with the operations in Sinai and Palestine. In the Romani operations in August 1916 sand sleighs were used, but it was found that camel transport was unsuitable for use in front of the main dressing stations. The advance across the Sinai desert was a triumph of the engineering and medical services over disease. One of the most interesting findings was that of the Klebs-Lœffler bacillus in the very prevalent septic sores by Captain C. M. Craig. The sores were subsequently treated by injecting the patients with antidiphtheritic serum, and many cases cleared up very rapidly.

During the battles of Beersheba and Gaza, it became important to avoid disclosing the fact that Imara was being prepared as a large hospital centre; and consequently the three casualty clearing stations had to pitch their tents and instal 3,000 beds during the night of the 30th|31st October, a feat which they accomplished in 12 hours, just one hour before the wounded commenced to arrive.

After the capture of Gaza, and with the advance on Jerusalem, Junction Station became the main evacuating station; with a capacity for moving 1,000 wounded a day by train and 600 by lorries. The final operations opened with the advance into the plain of Esdraelon. Until the plain was reached, however, there were no

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regular roads, and the greatest difficulty was experienced in keeping up with the advance. The plan adopted in general was to open out only one,—or at most two,—field ambulances as a divisional dressing station in the initial phase, and keep the remainder in reserve at good jumping off places for the advance. This system worked well. Further, it often proved better to carry the wounded *forward* with the advancing columns on camel transport until good roads were reached, than to attempt evacuation through difficult country. During the final and very rapid advance to Damascus and Aleppo the rapidity of the advance, the constant change of the line of supplies, the enormous numbers of enemy sick and wounded to be collected,—many of them in a most deplorable condition, and the outbreak of influenza in October 1918, were the chief difficulties encountered. The whole of the Sinai-Palestine operations, however, constituted as great a triumph for the medical and engineering services, as for the fighting forces themselves.

Whilst this volume is one essential to the administrative medical officer, it is also one which will interest all military medical officers in India. The maps are very clear and the small photographs well executed, whilst owing to the different countries and theatres of war dealt with, the volume is much more readable and of much more general interest than was Vol. II.

R. K.

THE INSULIN TREATMENT OF DIABETES MELLITUS. By P. J. Cammidge, M.D. (Lond.), D.P.H. (Camb.). Edinburgh: E. & S. Livingstone, 1924. Pp. 172. Price Rs. 4/8. To be obtained from Messrs. Butterworth & Co. (India), Ld., Calcutta.

THIS useful handbook contains a summary of the author's experience of insulin which, according to him, is probably as long as that of any one in England, for its manufacture was commenced in his private laboratory as soon as the details were available.

The author strongly recommends an exhaustive analysis of the blood, urine and fæces in carrying out insulin treatment, to be repeated at frequent intervals during the course of treatment. While agreeing that such detailed bio-chemical investigations are very helpful in the accurate diagnosis of the causes of the disease, we are afraid that such elaborate arrangements are only possible in big hospitals and research institutions and would not be readily available to general practitioners for whom the book is probably intended.

The author lays great stress on the importance of finding out the "difference value," i.e., the difference between the percentage of sugar in the blood and the percentage of total reducing material after hydrolysing the protein-free filtrate with dilute acid. In his opinion this difference value in normal healthy individuals is practically nil (not exceeding 0.008 per cent.), but in pathological conditions the total carbohydrates may be much increased and the difference value exceeds the normal figure very considerably either in fasting condition or after a meal. He illustrates this by plotting out curves for sugar, total carbohydrate and the difference values, which according to him, would differentiate four distinct types of diabetes:—

(1) The opposed type, due to pancreatic deficiency.
(2) The concurrent type, due to hyperfunction of the ductless glands and nervous dieases.
(3) The unrelated type, due to hepatic insufficiency.
(4) The kidney type, due to abnormal renal permeability.

Some of the views expressed by the author, though at variance with other workers, deserve careful consideration as the author's conclusions are based on long continued experimental work.

The book will be found useful to those who want to make a special study of diabetes with a view to insulin treatment.

J. P. B.

EPIDEMIC ENCEPHALITIS.—By Arthur J. Hall, M.A., M.D. (Camb.), F.R.C.P. Bristol: John Wright & Sons, Ltd., 1924. Pp. 229. Price 12s. net.

THIS monograph deals with a subject which, until recent years, has been practically unknown to the general practitioner, and even now the knowledge of most practitioners regarding it is probably very meagre.

A study of this work will, however, soon rectify this deficiency. Its style is lucid and clear and it deals with every aspect of the subject in a masterly manner which brings it clearly before the reader's mind and renders its comprehension a matter of but little difficulty.

In chapter I the historical aspect of the subject is laid before the reader very fully and readably. Epidemiology forms the matter of chapter II, and here the medical reader and hygienist will find much of value and interest. Its spread by contagion or infection and its relation to influenza are here very fully discussed and many cases and epidemics cited to elucidate the matter.

Chapter III (Pathological) deals firstly with the macroscopic and microscopic changes arising from this disease and then the results of bacterial investigations are discussed very fully.

Subsequent chapters describe in detail the clinical manifestations during an acute attack and the "residua" or later symptoms which persist after the subsidence of the primary acute symptoms.

Diagnosis, prognosis and treatment are dealt with very fully and clearly.

A very marked feature of the book is the enormous number of references given. Not only is there a list of these at the end of each chapter but the book closes with a bibliography containing probably every publication on the subject since its appearance was first recognised.

It is a book we can thoroughly recommend to the notice of the general practitioner. Not only is it written in an extremely readable manner, but the information which it contains on this little known subject is likely to prove of enormous use, not only to the individual practitioner but to the world at large, for the more our knowledge of such conditions extends, the more likely are sporadic cases and small epidemics to be correctly diagnosed, and thus information gathered which may assist in clearing up some of the points still demanding investigation and elucidation.

A. W. O.-R.

AN OUTLINE OF ENDOCRINOLOGY.—By W. M. Crofton, B.A., M.D., Lecturer in Special Pathology, University College, Dublin. Edinburgh: E. & S. Livingstone, 1924. Pp. 126, 50 illustrations, including several microphotographs. Price 6s. net.

THIS little volume meets a much felt want; that of a simple, reliable and easily readable outline of endocrinology for the medical student and general practitioner. There are two ways of administering glandular therapy; the first and most popular consists of shot-gun prescriptions based on an absolute ignorance of the present day knowledge of the functions of the different endocrine glands, and amounts to sheer quackery; the second is the rational use of endocrine extracts based upon a full knowledge of the subject, and here such therapy is becoming of more and more importance in every branch of medicine.

Dr Crofton's chapters deal in turn with the pineal gland, the pituitary, suprarenal, thyroid, parathyroid, thymus, the gonads, the hormones of the gastro-intestinal tract and the pancreas. A short epilogue deals with the probable lines of evolution of the endocrine glands and their general bionomics. Throughout the book, a series of splendid photographs of such conditions as acromegaly, dystrophia adiposogenitalis, premature adolescence due to destruction of the adrenal

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cortex, cretinism, Graves' disease, and myasthenia gravis, are of special interest; whilst the microphotographs of the histological structure of the different glands are admirable. Insulin is dealt with fully, blood sugar curves being given. The author regards the pancreas as the great manufactory of *adaptive* co-ferments. Before birth the fœtus depends upon the placental circulation for a properly balanced food supply; but the adaptive function of the pancreas is gradually built up, so that after birth it takes on the function of correlating different ferment activities. He suggests that in cancer possibly non-adapted chorionic cells come to be included as islets in the different body tissues, independent of the general metabolic and nervous mechanism control, and that such may be the sites of origin of cancer.

Apart from diabetes, the rôle of the endocrines in such tropical diseases as dysentery and malaria is to-day only beginning to be dimly understood. Glandular therapy is, however, widely resorted to in this country, and we wish that every practitioner who indulges in such therapy would read and study this excellent little volume in order to grasp the fundamental facts upon which endocrine therapy must rest, if its administration is to give good results.

COLLECTED PAPERS OF THE MAYO CLINIC. Edited by Mrs. M. H. Mellish. Vol. XIV. (1922). London and Philadelphia: W. B. Saunders Company, 1924. Pp. 8vo. Price 63s. net.

It is always a pleasure to review this annual volume which gives one an abstract of the whole output of published work of the Mayo Clinic for the year. About 140 papers are comprised in the volume, most of which are abstracts of papers which have appeared previously, sometimes in publications which are not readily accessible in this country. The range of subjects is so great that it is not possible for a reviewer to do more than touch on the papers of most general interest.

One turns first to the sections on gastric surgery, a branch in which the immense amount of clinical material handled by the clinic enables steady progress to be made year by year. W. J. Mayo finds that the surgical treatment of duodenal ulcer is satisfactory in 95 per cent. of cases, with an operative mortality of under 2 per cent. In 1 to 2 per cent. of cases a second operation is necessary, and for such cases an excision and a Finney's pyloroplasty gives the best results. In cases of gastric ulcer, satisfactory results are obtained by one operation in 85 per cent. of cases. In the remaining cases a secondary operation, preferably resection, brings the surgically satisfactory group well above 90 per cent., but there is a definite cancer liability in the years to follow. The operative mortality of gastric ulcer is 3 per cent. Half of the failures are due to functional trouble and merely require suitable diet and medical treatment, a fact which is recognised in the clinic by the transfer of these patients to the care of the physicians as soon as their wounds are healed. The most frequent cause of failure is to operate for peptic ulcer where there is no ulcer; it is impossible of course to ascertain how prevalent this practice is, but if we recollect rightly certain figures given in a previous volume, the surgeons at the clinic are kept quite busy unravelling the suturing of operators whose zeal and dexterity exceed their diagnostic powers. Since it is impossible to be sure whether a large ulcer has not already become malignant, Balfour advises that resection should be performed in all such cases. MacCarty lays down, as the result of 1,400 *x*-ray examinations, that all ulcers of 2.5 cm. and over may be taken to be malignant, and Balfour, after following up 1,280 patients who were operated on for gastric ulcer in the clinic, finds that 75 were known to have died from gastric cancer subsequently; in all these cases the ulcer was recorded at operation to have been a large one. The same authority urges excision of all duodenal ulcers in which there is a history of hæmatemesis, gastro-enterostomy alone having failed to prevent recurrence of the hæmorrhage in 13 per cent. of cases. Judd and Lyons advocate sleeve resection for large multiple ulcers, whilst W. Mayo owns to an increasing preference for the Billroth No. I method of partial gastreotomy, though we do not find the reasons very explicitly stated for the adoption of this more difficult operation. Hæmangioma of the stomach is a rare condition, of which Judd and Rankin record the successful surgical treatment of 4 cases, two of which were diagnosed as benign tumour. Though no great advance in gastric surgery is recorded, the general tendency is towards agreement on the correct treatment of conditions which have been a battle ground for years past.

Mann and Magath bring forward a series of interesting studies of liver function which are of current interest. Total removal of the liver in dogs led to a steady decrease in blood sugar, convulsions, coma and death. Intravenous injection of glucose temporarily arrests these symptoms and restores the animal to normal. This can be repeated many times before coma eventually develops with the blood sugar at a high level.

Carman has a beautifully illustrated article on the *x*-ray diagnosis of carcinoma of the colon, and in the same connection we find an interesting paper by Judd and Rankin advocating the performance of ileostomy in all cases of resection of the colon, to act as a safety valve and take tension off the suture line.

Judd, Braasch and Scholl have interesting articles on horseshoe kidney and duplication of the renal pelvis, in which they show that though these kidneys are more liable to hydronephrosis and other diseases, the results of surgical treatment are good. Rosenow continues his interesting studies of electric localisation of streptococci. He has succeeded in producing focal infections of the kidneys with calculus formation in dogs, by infecting the pulp cavities of teeth, previously devitalised, with strains of streptococci isolated from the urine, infected teeth and tonsils of patients suffering from nephrolithiasis. No improvement in the results of treatment in carcinoma of the prostate is recorded after an extensive trial of radium by Bumpus.

Goeckermann records 2 cases of discolouration of the skin following the use of face creams containing mercury, the alkalinity of the sweat being presumably the cause of the precipitation.

In 33 cases of arsenical dermatitis Stokes found focal infections in 27 patients. An important point brought to light is that any form of treatment of the focus of infection is likely to aggravate the dermatitis. The superiority of the dark field method in the diagnosis of syphilis is well shown by Stokes and McFarland, who obtained positive results during the first week in 80 per cent. of 231 cases.

Judd and New record 24.4 per cent. of 5-year cures in 118 cases of epithelioma of the tongue; 8 and 10-year cures were only obtained in cases without glandular involvement.

Two papers by Meeker on paravertebral and transsacral nerve block anæsthesia form, with their beautiful illustrations, almost a complete monograph of the subject.

We must call the editor's attention to the fact that Hedblom's paper on the "Diagnosis and Treatment of Tuberculous Empyema" appeared in the 1921 volume of the Collected Papers, and has been reprinted word for word this year. We do not often catch the Mayo Clinic out, but when we do we cannot resist the temptation of taking advantage to do so.

In conclusion, we have only to say that the volume is as full of interest as usual and should be in every library.

W. L. H.

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United Provinces. ——, M.B., Ch.B. (Edin.)
May 21st, 1924.

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Annual Reports.

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1922. WITH APPENDICES. VOL. I. SIMLA. GOVERNMENT OF INDIA PRESS.

THIS report presents several new features and is an interesting résumé of sanitary conditions throughout India in 1922. The statistical information available is as before, but the comments have a broader aspect and the whole report, if we may say so, bears more of the stamp of the individual than of the office. The opening portions are appropriately concerned with the state of health of the army, British and Indian. Cantonments in ordinary times should originate very little disease from within, but importation of disease from the surrounding civil population is a constant menace, and the amount of this latter disease is a measure of the increase of disease in the civilian population and of the preventive measures which are feasible and possible in cantonments. Cantonments should be oases of health in a desert of sickness. Ross for instance says mosquito nets should never be necessary in a cantonment. The recent liberalising of the Cantonment Act will, it is feared, in some quarters lead possibly to a relaxation of disciplinary control of sanitary matters.

The review of the health of British troops in India brings out several interesting points.

A marked reduction both in the admission rate and constantly sick rates has occurred, and these are now approaching the pre-war averages. A marked improvement has taken place in the physique of the new drafts of recruits. Bacterial diseases such as enteric fever and cholera, which used to be considered natural accompaniments to Indian service, are now diminishing rapidly in the army.

The two great classes of disease responsible for sickness are diseases due to biting insects and venereal disease. Of the former, malaria and dengue are the chief and account for the high "admission rates" of certain stations, while venereal disease is the cause in most cases of high "constantly sick" ratios. Only one case of cholera occurred in the British Army in India .....a remarkable record.

In 1922, 180 cases of enteric occurred with 25 deaths. It is noteworthy that while the mortality rate for typhoid remains steady, that from paratyphoid *A* shows a distinct tendency to rise since the war. In the army enteric is nearly always due to carriers; urinary carriers were responsible for an outbreak of 13 cases at Delhi. Examinations of convalescents show a carrier rate of 5.2 per cent. and some remarkable cases of mixed carriers were found, where both *B. typhosus* and *B paratyphosus, A* were found in the same individual, *para. B* has not established itself in India despite the large number of cases occurring in 1918, while no case of *para. C* occurred in 1922.

Malaria is the biggest problem in military as well as in civil life. It is the chief cause of sickness, and its debilitating effects are the cause of many other cases of sickness and death, notably heatstroke and lobar pneumonia. It is evident that the subject is being very seriously studied and much information has been gained on the first essential, viz., a knowledge of the anophelines of each area and their malaria carrying propensities, their breeding places and habits. The climatic variations and fluctuations of Northern India result in malarial epidemics, but close study has enabled attempts at forecasts to be made and endeavours to anticipate and frustrate epidemics. About 80 per cent. of the malarial cases are diagnosed microscopically, a lesson to the civilian practitioners of India.

Sandfly-fever counted for 1,736 admissions: no practical preventive measures have yet been devised against the bite of the sandfly, and the best way lies in the reduction of breeding grounds.

Dengue fever showed 810 admissions, 30 per cent. of which were in Calcutta.

The statistics of dysentery are interesting, about 90 per cent. of the cases being returned as protozoal in origin. The Sanitary Commissioner suggests that there may be a discrepancy here owing to the comparative difficulty in isolating *B. dysenteriæ*. It is probable that a large proportion of the dysentery group cases were bacillary in origin.

Venereal Disease.—The admission rate decreased for the third year in succession, a very satisfactory aspect. (Experience of the country, early treatment rooms and the stabilising effect of peace conditions are given as reasons.)

The Central Dermatological Laboratory at Poona carries out all reaction tests and serves as a centre for training officers in treatment and diagnostic methods.

The health of the Indian troops has also fluctuated in much the same manner as in British troops, but the change has been less marked. The admission rates are not yet down to the pre-war level. The station hospital system, introduced in 1918, has had the effect of raising admission rates for various reasons, indeed the report suggests that the system has not been productive of the benefit expected from it. Malaria is still the most potent factor in the admission rate; there has been a satisfactory reduction in the enteric rate, but a large rise in venereal admissions is disquieting; this rate is double that of the previous period.

The rations for Indian troops are stated to be below the standard in anti-scorbutic substances and there were 58 admissions from scurvy during the year. Cholera and small-pox were noticeable for their low rates. Malaria is seriously and intimately studied, the blood of every man returning from leave being examined. 1922, however, was a mild year in malarial incidence. In Indian troops also malaria is considered to be the underlying factor in providing the high incidence and death rate of lobar pneumonia.

The Health of the General Population.—"The death rate in British India for 1922 was 24.02 as against a quinquennial mean of 38.42. This represents a saving of over three million lives. The comparison is hardly fair as the mean is raised by the influenza epidemic in 1918. If the figure for 1921 be taken the saving in life amounts to over 1½ millions.

It cannot be too strongly impressed on the Indian public that there is no reason why this economy in life should not continue and be improved on. Life, for which health is a prime necessity, is purchasable, and is the greatest asset any nation may acquire. Health is now a provincial and transferred subject, and is therefore in the hands of the Indian public. The future of the Indian nation depends on the answers given by the people to the questions:—

(1) Do the people desire to continue this saving of life and to improve it?

(2) What price is the public willing to pay?

There is no question but that the response to (1) is affirmative. The reply to the second will be contingent on the public understanding what must be done to secure it.

In order to open the eyes of the public a campaign of enlightenment is essential. The reports of the Directors of Public Health show activity in this respect, but propaganda will not suffice. Hard facts must be placed in the possession of members of the Legislative Assemblies and Councils, for it is with the Legislative Bodies that initiation in action lies. Perhaps the most urgent requirement of India at the present day, when Indian politicians desire to create a strong nation, is the appointment of a Commission to enquire into the actual health conditions of the people, and to make definite recommendations on the measures necessary to secure a reasonable standard of health.

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Reference was made in the last report to public health legislation. It may again be emphasised that such legislation has an educative as well as a compulsory aspect. It should also be remembered that the work of local authorities can be and should be supplemented by voluntary societies, supported by voluntary contributions, acting in unison with local authorities."

Birth Rate.—The birth rate for British India was 31.85, against 31.97 in 1921 and a quinquennial mean of 33.97.

The death rate was 24.02 against 38.42, the quinquennial mean.

The urban death rate was 27.5 compared with 35.31 in 1921.

The rural death rate was 23.69 compared with 30.33 in 1921.

These figures point to a response of the population to an improvement in conditions following two successive good seasons, and an absence of epidemics.

The inaccuracy of registration of births and deaths is again commented on. A special investigation carried out in Bengal revealed the fact that about 50 per cent. can be added to recorded birth and death rates to get a true figure. In all previous reports similar errors occur, though the percentages of error vary. As the Sanitary Commissioner remarks "in the days when India is entering international health organisations she cannot afford to neglect a matter of such fundamental importance as the registration of vital occurrences." The subject of infant mortality is dealt with in some detail and rightly so. Infant mortality is a sensitive index of the health conditions, especially as regards general conditions under which the people live, it is these conditions which require attention if any real influence on infant mortality and on the health of the nation is to be exercised. One-fourth of the total mortality in India occurs in infants and this is a clear indication that a clean environment, the first essential of health, is generally neglected. 1,346,280 deaths during the first year of life were recorded, or 23.2 per cent. of the total mortality.

The infantile mortality calculated per 1,000 of the registered births was 175. This rate was highest in the Central Provinces viz. 280, but there were fallacies in registration which make comparisons inadmissible. 50 per cent. of the infant mortality occurred during the first month of life. The causes of infant mortality are various but mainly environmental. Tetanus neonatorum, which is a fertile source of mortality in Bengal, is apparently not so in other provinces as it is not figured in the list of causes. The rates given for towns are appallingly high. In Poona for instance it was 1,064 per 1,000 births. Maternity and child welfare work has received wide publicity of late years and the progress made is shown in the list of welfare centres and in the accounts of their activities. The crying needs are health schools for training workers and a large increase in the annual subscribers to voluntary societies. It will be many years before Governments and local authorities can by themselves tackle the problem.

Fevers.—In British India three and a half million people die annually of fevers. The wastage from sickness is also enormous. Of these fevers the chief is malaria. Eight million cases or 3 per cent. of the population attend hospitals and dispensaries for malaria. Thus Dr. Pais writes "Malaria impresses not only physical marks, but above all, physical degeneration on the race it smites. Distrust towards works of a social character, diminished will-power, diminished liking for work, restricted vision towards all the phenomena of life, are special characteristics of those with chronic malaria and of the peoples who have long suffered from the infection."

Anti-malarial measures are discussed in a critical manner. The position in regard to quinine should be understood by the public. The world's output of quinine is about 1,000,000 lbs. and 90 per cent. of this comes from Java. India's consumption is 160,020 lbs. If cases in India were properly treated 500,000 lbs. at least would be required and possibly even 1,500,000 lbs.—more than the world's supply. India could produce the quinine, though it might not be a paying proposition, but it would pay in health betterment.

It may be said that there is no question of the effective treatment of malaria in India until the consumption of quinine approximates to 500,000 lbs.

Relapsing Fever.—The light thrown on this disease by the classical researches of the late Major Cragg has resulted in investigation into the incidence of the disease generally. It is probably more widespread than is usually supposed. In the Punjab it was shown how ready the people are to accept treatment, the efficiency of which is demonstrable and which is made readily available. The Director of Public Health, Madras, continued his observations in 1922. Madras has apparently been free of relapsing fever for nearly a century and the epidemiology of the present occurrence there is of great interest.

Typhus and typhus-like fevers in the Northern parts of India demanded investigation and much was done in this direction by the late Major Cragg, whose death from typhus while investigating it has been an irreparable loss to India.

Kala-azar.—Intensive treatment is carried out in Assam where 20,000 people attended. 2,292 deaths were recorded from Assam and 1,531 from Bengal, though the Director of Public Health considers these latter figures to be below the actual.

Influenza was nowhere epidemic.

Respiratory Diseases.—The number of deaths from these is probably not realised. Pneumonia, especially in association with malaria, is one of the principal causes of death in India. Increased attention to pneumonia and other respiratory diseases is necessary.

Pulmonary tuberculosis is second only to malaria in its economic importance. The deaths returned from cities show a serious position but the real incidence can only be guessed at. Dr Bentley states that in Bengal alone 100,000 persons die annually from phthisis.

Cholera.—1922 was not a bad year for cholera in India, though the cause of decline was not probably associated with any concerted preventive measures. Dr. Bentley in Bengal produces definite evidence that in certain places the fall was certainly associated with preventive methods. The obvious solution of the problem is the provision of District Health Staffs trained in preventive methods, and whose duties would be defined as such. Bengal has certainly led the way in this respect, and most other provinces are beginning to follow suit.

In regard to other intestinal disorders, more accurate diagnosis is essential and this should be forthcoming with the growth of medical schools and colleges.

Plague.—Plague must be attacked while it is quiescent. This is expensive, but is the only real way of preventing its devastations. 77,615 deaths occurred from plague in 1922 as against 69,682 in 1921.

Small-pox.—This disease is certainly preventable, yet in Madras Province it caused 22,801 deaths in 1922. "A truly deplorable record," as the Sanitary Commissioner states.

A very interesting history of vaccination is given:—

"Genuine cow-pox vaccine was introduced into Bombay on 14th June 1802 and from there supplies were distributed to various centres, including Madras and Ceylon. From Madras it was sent to Calcutta. In May 1806 the principal inhabitants of Calcutta transmitted to Dr. Jenner a sum of £4,000 as a 'testimonial of their gratitude for the benefits which Calcutta, in common with the rest of mankind, has derived from his inestimable discovery of a preventive of the small-pox.' Bombay shortly after sent £2,000 and Madras £1,383.

"In 1827 the Honourable Mountstuart Elphinstone, Governor-General of Bombay, introduced the Bombay system of vaccination, under which the vaccination work of the Presidency was placed under a Superintendent of Vaccination with an establishment of vaccinators under him. The progress of vaccination in India depended on

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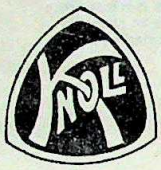

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the date on which other Provinces followed the example of Bombay. In 1854 this system was introduced into the North-West Provinces; in 1864 into the Central Provinces, and in 1865 into the Madras Presidency.

"In 1868 Provincial Sanitary Commissioners were appointed, and these officers eventually took charge of the vaccination work in all parts of India. It is from this date that statistics are available and it is interesting to compare the small-pox mortality in Bombay during the period 1868—1887 with that recorded in the United Provinces, Central Provinces, Madras and Punjab in which the Bombay system of vaccination was established so many years later.

"Up to the beginning of the present century vaccination was mainly from arm to arm, i.e., with human vaccine. The use of calf vaccine was practically confined to the larger cities. Now arm to arm vaccination has been entirely superseded by calf to arm vaccination; the calf vaccine being preserved either in glycerine or lanoline. Contrary to expectations the results with lanolinated vaccine have been very disappointing: lanoline was used to the exclusion of glycerine in Madras Presidency only and the case success rate for primary vaccinations fell as low as 70 per cent.

"Unfortunately anti-vaccination propaganda is spreading in India and any advance is now very difficult. The Vaccination Act was passed in 1880, and was amended in 1909. It is intended to give power to prohibit inoculation and to make the vaccination of children compulsory in certain Municipalities, Cantonments and Notified Areas. The extension of the provisions of the Act to any Municipality can only be made on the application of a majority of the Municipal Commissioners. The Act makes primary vaccination of any unprotected child residing in the area to which the Act applies and between the ages of 6 months and 14 years compulsory. The population of the areas to which the compulsory Act applies is less than 16 millions or about 7 per cent. of the total population of British India. It will thus be seen that vaccination has not been forced upon the people of the country, who, in spite of their fatalistic attitude to disease and small-pox in particular, have voluntarily adopted vaccination as the only sure protection from the appalling consequences of small-pox."

In 1869 the death rate from small-pox was 2,120 per million.

In 1922 it was 160 per million.

"The following points are noteworthy:—

"(1) Had the average annual mortality during the decade 1868 to 1877 pertained in the last quinquennium, the average annual mortality during the latter period would have been 248,712 instead of 82,388; a saving of 166,324 lives a year.

"(2) The experience in Madras, where there has been a marked rise in mortality during the past quinquennium due entirely to inefficient vaccination, is a definite indication that small-pox can still assume epidemic proportions when bad vaccination affords insufficient protection.

"(3) The improvement in small-box mortality is certainly not due to any public health measure except vaccination; for isolation of cases and contacts can only be applied very exceptionally and the conditions under which people live show little improvement.

"It should be noted that this reduction in small-pox mortality has been effected in spite of the greater facilities for the transference of infection through greatly improved and expended means of communication, which play such an important part in the spread of all epidemic diseases in India.

"The total annual cost of vaccination is Rs. 30,79,716. This is rather more than it actually costs, for salaries of officials and vaccinators are entirely debited although they do other work besides vaccination. The cost of saving 166,324 lives annually from small-pox comes, therefore, to just over 2 pies (under one farthing) per head of population annually, or to about an anna (one penny) for a family of five.

"The prevention of small-pox is the only matter in which the public health departments in India have been given a real chance. One may well ask what would be the gain to India if the prevention for other diseases were tackled seriously? Yet committees composed largely of business men have advocated reduction in expenditure on public health."

Health Staffs.—In Bengal every district except one has a district health officer. In the Punjab there are four, in the United Provinces two.

A description of the work carried on at the various parts of India is given.

Jails.—Attention is again drawn to the fact that the sickness in jails shows no evidence of any reduction. This is undoubtedly due to the prevalence of disease among the free population. There can be no doubt that the incidence of disease in the jail population depends mainly for its reduction on measures taken to free the general public therefrom. Not only so but the admission of a large number of prisoners from an unhealthy district is a danger to those coming from more healthy districts. That epidemics are not common in jails is due to the vigilance and care of the respective jails staffs. The moral is that any real improvement in sickness exhibited by prisoners is contingent on increased attention to the conditions underlying the health of the general population. It is, therefore, most unfortunate that the present financial stringency has resulted in many parts of India in a demand for retrenchment in expenditure on health, which is such a vital and primary necessity for any nation.

A. D. STEWART.

ANNUAL REPORT FOR 1923 OF THE NATIONAL ASSOCIATION FOR SUPPLYING MEDICAL AID BY WOMEN TO THE WOMEN OF INDIA, (COUNTESS OF DUFFERIN'S FUND); AND OF THE LADY CHELMSFORD ALL-INDIA LEAGUE FOR MATERNITY AND CHILD WELFARE. 115 PP. CALCUTTA: SUPDT., GOVT. PRINTING, INDIA. PRICE RS. 2.

THIS report is a compendium which includes the 10th annual report of the Women's Medical Service for India; the 22nd annual report of the Victoria Memorial Scholarship's Fund; the 1st annual report of the Lady Reading Women of India Fund; and the 3rd annual report of the Lady Chelmsford All-India League. Consequently it is both difficult reading and very difficult to review, since sections, sub-sections and local reports follow each other in a bewildering succession. In attempting to review it, we may disregard the many pages devoted to rules, regulations, lists of hospitals in India staffed entirely by women, medical women in India, Burma and Ceylon, and the like. They could be well relegated to appendices, not to one or other section of the volume, but to the end of the entire volume, where they would be useful for reference.

Two important events marked the year. The first was the co-ordination of the Governing Bodies of the four different bodies concerned, thus securing an efficient, centralised board of control. These very important organisations have originated at different times; their scope of work largely covers the same ground; and a multiplicity of committees was concerned, now replaced by one central organisation. The different funds concerned, of course, under inexorable law have to be kept strictly apart and separately administered, and such a state of affairs seems to be inevitable without some special emergency legislation which would permit of amalgamation. In the business world it is a commonplace for firms with similar aims to unite into a joint partnership, but with official funds the case is of course quite different. There is no royal road to cutting through a bundle of red tape; it can only be unravelled. Hence the complexity of the report. The unification of the central administration, however, promises well for the future.

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The second chief event of the year was the retirement of Dr. Margaret Balfour, Secretary to the Countess of Dufferin's Fund for the past 8 years, and the pioneer of maternity and child welfare work in India. We wish that we could give here some outline of all the important activities for the welfare of the women and children of India which she has fostered and cared for; but, apart from a photograph, the report is silent on this subject; it is an official compilation, largely statistical in structure. Possibly some of our readers may be able to supply the defect. The various efforts which Dr. Balfour has been so instrumental in setting on foot in India have an immense future before them, and an immense field of useful service.

The Countess of Dufferin's Fund shewed total annual receipts of Rs. 1,79,057, and a closing balance in hand of Rs. 59,465. Two scholarships in the United Kingdom were awarded to Mrs. Sivakamu and Miss K. Halloran. Scholarships were endowed for lady medical students at the Lady Hardinge College, Delhi; the Campbell Medical School, Calcutta; and at Madras. The grants in aid were liberal, one very prominent feature being a grant of Rs. 4,402 to the Assam branch for extension of the work in that province. There were 38 medical officers on the cadre of the Women's Medical Service for India during the year, and 5 new officers in addition admitted on probation. The foundation stone of the new Lady Reading Hospital for Indian women and children was laid at Simla in June. This hospital will meet a much felt want.

The reports by the different officers of the Women's Medical Service for India may next be briefly summarised. Miss Dagmar Curjel reports that in the Punjab there has been a very definite advance. The financial situation is still stringent, but there has been a marked increase in the number of women and children seeking medical aid, both as out-patients and in-patients, and it is hoped that the Lady Aitchison Hospital at Lahore will soon be brought up to date. Dr. E. Hamilton-Browne reports that the work of the Dufferin Hospital in Calcutta continued at much the same level as previously; the staff were severely affected by the dengue epidemic of 1923, but weathered the storm, and the work of the hospital was continued without any diminution. Fourteen nurse pupils were registered during the year. Dr. S. H. Commissariat comments on the need for an improved standard of training of female medical subordinates in the United Provinces and on the public apathy towards the enormous problems of maternity and child welfare shewn by the general public,—an apathy chiefly due to ignorance. At Agra the Women's Medical School has been re-organised, making it a self-contained school with a staff consisting entirely of women. At Vizagapatam, the Rani Sahiba of Wadhwan has come forward with a generous endowment of 2 lakhs towards the object of the taking over of the Victoria Hospital from Government by the Countess of Dufferin's Fund. A cyclone on November, the 17th, cost the hospital some Rs. 1,000 in damage done. Dr. Beadon reports a notable increase in the number of obstetric cases at the Victoria Hospital for Women, Madras, during the year, the figures having risen from 1,065 cases for the first eleven months in 1922 to 1,175 for the same period in 1923. A radiant heat appliance is in use and has given great satisfaction, especially in cases of pelvic inflammation. The Dufferin Block of the Ripon Hospital at Simla was overcrowded throughout the year, but it is hoped that the new Lady Reading Hospital will be opened during 1924. The Lady Dufferin Hospital at Karachi treated 8,934 new out-patients and 1,656 new in-patients during the year. No less than 436 lady students are at present studying with a view to medical qualification in the different medical schools and colleges in India.

The Victoria Memorial Scholarships Fund has continued and expanded its programme during the year. About 57,000 women die in childbirth in India annually, a figure which is some 50,000 in excess of what would occur if conditions were the same as those in England. The maternity scheme at Dacca has met with gratifying success. Throughout the country, in Hyderabad, Deccan, and at the centres throughout India generally, training of *dais* and of midwife supervisors is in progress. In Baroda an Act has recently been passed on the lines of the British Midwives' Act of 1902, regulating the practice of midwives in the State. At Ajmere the maternity home has moved into a larger building, and a new infant welfare centre has been opened in connection with it.

The Lady Reading Women of India Fund came into existence in January 1922, and already shews total receipts of Rs. 13,32,630, as against an expenditure of Rs. 11,15,930 during the same period. This Fund has at present three main objects; the provision of a hostel for the nursing staff of the Lady Hardinge Hospital at Delhi; the provision of a first class hospital for Indian women and children at Simla; and the establishment of an Indian Nursing Association with the intention of raising the status and standard of training for Indian nurses. With regard to the first, the building was officially opened by Her Excellency the Countess of Reading in February, 1923; the building gives accommodation for 70 nurses and cost 3 lakhs of rupees. The second project is well on the way towards completion. The third is in progress of organisation, but at present the number of applicants to come forward is but scanty. Scholarships to the United Kingdom were conferred upon Miss Lavina Mewa and Miss Maula Buksh, whilst two other scholarships for the training of high caste Hindu nurses were granted at the Dufferin Hospital, Calcutta.

The Lady Chelmsford All-India League shewed an expenditure and income of some 1¼ lakhs during the year. Its travelling exhibition had a very successful year and visited Calcutta, Cawnpore, Bareilly, Lahore and other centres during the year. Its quarterly journal, *Maternity and Child Welfare in India*, has proved a financial success. A successful creche was opened at Raisina for the children of coolie women engaged on the building of the new secretariat in the new capital of India. The baby week movement for 1924 was actively supported and financed to an extent of Rs. 10,000. The Delhi Health School carried on useful work throughout the year and passed out four qualified students in July, 1923.

. . . . . .

We have attempted to gather together the salient features of this report. In the aggregate the sums dealt with by these funds are not inconsiderable; their activities cover India with a network of valuable activities, all directed towards the same objectives, the provision of better and skilled medical attendance on the women of India by trained medical women; the improvement of the present awful maternity and infant mortality rates. The problems to be faced are enormous; that they are being tackled in no niggardly a way is evident on every page of the report; further, the funds concerned have a strong official backing from among the highest and the most influential in the land.

ADMINISTRATION REPORT, GOVERNMENT OPHTHALMIC HOSPITAL, MADRAS, 1923. BY MAJOR R. E. WRIGHT, B.A., M.D., B.A.O., D.P.H., I.M.S., MADRAS: SUPDT., GOVT. PRESS, 1924. PRICE RE. 1-2.

As usual, this annual report contains a mine of interesting information, and is one which should be read in the original by all ophthalmic surgeons in this country.

Turning first to its administrative section, 170 beds were available during the year, and the average daily sick numbered 265. An additional block for 100 beds has been sanctioned and estimates have been submitted to government, whilst minor improvements were carried out during the year. 180 medical students and 34 post-graduate students received training during the year, some of whom came from as far away as the Federated Malay States and Port Blair; indeed its excellent

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teaching is one of the best features of this well run hospital. There is no need for the would-be ophthalmic surgeon to go to Europe for training; he can get as good in Madras. Financially the year was slightly more expensive than was 1922, owing to the higher rates of pay sanctioned for some members of the staff. The Poor Fund was well supported by local firms and individuals treated at the hospital, and is a satisfactory feature of the work. Major Wright was in charge throughout the year, except from April 26th to December 31st, when Capt. P. Verdon, B.A., I.M.S., officiated for him during his leave home. The volume of work got through was enormous; 4,096 total in-patients and 21,575 out-patients. There were 5,588 operations in all, including 1,613 for senile cataract.

The professional side of the report is one which will be of great interest to our readers. Of the 1,613 cataract operations, 1,452 were carried out by the Madras method, and only 2 by expression. The success rate in the former was 88 98 per cent., a figure of which the hospital may well be proud. Partial failures numbered 3 09 per cent., failures 0.40 per cent., and the vitreous loss rate was only 1.23 per cent. Of the 7 failures, 2 were cases where panophthalmitis developed, one of expulsive hæmorrhage, one of primary and 3 of secondary infection. The partial failures and partial successes, numbering in all 151, were chiefly the results of post-operative complications such as impactions of the uvea or capsule in the section, iridocyclitis of latent infection type, slowly healing sections from constitutional causes, and fundus disease. One case only of turned section occurred.

In place of the ordinary Madras operation with complete iridectomy, during Capt. Verdon's tenure a series of 376 cases were operated on in which a small peripheral iridectomy was adopted after delivery of the lens. The results were uniformly good. Iris prolapse occurred in only 1.8 per cent., as against an incidence of 12.7 per cent. in 336 cases of simple operation and 2.7 per cent. in cases with complete iridectomy. Peripheral iridectomy gives certain advantages, chiefly a better refractive result and also it tends to prevent ragged portions of the capsule or of immature cortex from becoming engaged in the wound, also a lessened risk of vitreous loss. On the other hand, it is more difficult to wash out the contents of the capsule, and there is more tendency to after-cataract. It is proposed in 1924 to carry out further observations on the operation. An interesting feature which appears from the figures is that the flap does not seem to offer any protection from primary and secondary infections.

A curious statement having appeared in a medical journal to the effect that "Dr." Kirkpatrick had *recently* introduced needling before extraction in his practice in Calcutta, Major Wright points out that Colonel Kirkpatrick worked in Madras, and not in Calcutta, and that the technique was first introduced in Madras by Major Drake Brockman in 1879, and was probably even then not new. The ordinary "Madras operation" for cataract consists of a preliminary needling of the cataract, limbal section—the point of the knife being introduced through the needle puncture, and a complete iridectomy. The suggested difficulty of aqueous escape is a bogey. 148 cases of after-cataract were needled.

There were 138 cases of sclero-corneal trephining, 123 of them for glaucoma. All except 7 shewed improvement. In 63 sclerotomies of other type, vision was improved or regained in 11, including 2 cases blind for more than 3 months.

In the refraction room 4,482 cases were dealt with during the year. There were 304 cases of fundus disease studied. In 210 such cases, syphilis was present in 99 and absent in 111 and it will be seen how important is this disease in the causation of such conditions as optic atrophy, optic neuritis, choroiditis, etc. In cases of secondary optic atrophy with very little remaining vision and a positive Wassermann reaction, a thorough course of anti-syphilitic treatment may improve matters.

In the out-patient department there were 3,241 cases of catarrhal conjunctivitis (cause undiagnosed), 1,802 of Koch-Weeks conjunctivitis, 391 of angular conjunctivitis, 92 of gonorrhœal ophthalmia, 772 of trachoma and 801 of phlyctenular conjunctivitis, together with much other interesting work.

The Elliott School museum was enriched during the year by a set of stereoscopic photographs illustrating the appearances seen on section of the globe in couched eyes; and a present made to the London School of Tropical Medicine of a series of water-colour plates representing external diseases of the eye as met with in the out-patient department. The pathological section is very hard worked; the work calling for very large numbers of clinical examinations, including some 10 bacteriological investigations of the conjunctival sac a day; 51 eyeball specimens and 67 histopathological tissue preparations were made during the year.

Investigation of the incidence of late infection after trephining was carried out during the year. Three out of 471 patients came back to the hospital with late infection after sclero-corneal trephining, and 6 out of 3,079 cataract patients; but these figures are of course not the figures of actual incidence. A record has also been kept of cases where excision of the injured eye had been advised for fear of sympathetic ophthalmia, and refused by the patient; out of 44 such cases only one has so far shewn symptoms of sympathetic ophthalmia.

Perhaps the most interesting feature of Major Wright's report, however, is his special report on an analysis of all the fundus disease cases met with between 1919 and 1922. Of 418 such cases of disease of the optic nerve, syphilis was held to be responsible for 223 cases, or just over 50 per cent., and specially for post-papillitic atrophy, neuritis, and simple atrophy. Optic nerve disease of unknown origin accounted for 21 per cent. Classical tabes is rare, but 2 cases were observed in children. Of the remaining 29 per cent. of cases, the special causes apparently responsible included small groups due to arterio-sclerosis, pituitary enlargement or tumour, cerebral tumour, diabetes, albuminuria, tuberculous meningitis and meningitis of other types and 6 cases following child-birth, but in the absence of eclampsia and albuminuria. Malnutrition is an important factor, especially among children. Tobacco and alcohol do not appear to have been incriminated; and isolated cases were due to malaria, quinine, methyl alcohol, occlusion of the central artery and leprosy.

For the same period, 1919-1922, cases of diseases of the choroid, retina, etc., totalled 434. Syphillis was here in evidence, either clinically or from the Wassermann reaction, in over 50 per cent. of the whole. The other main causes appeared to be retinitis pigmentosa, 64 cases; diabetes, 17 cases; arterio-sclerosis, 5 cases. Albumin was encountered in the urine in 13 of these cases, 10 of them shewing very high blood pressure. A case of quinine amblyopia, first seen 2½ years before, returned to hospital for re-examination. There was very marked constriction of all the retinal arteries, with a very pale disc, especially to the left side; the appearances, in fact, resembled those in a case of syphilitic post-papillitic atrophy.

One of the most marked differences between cataract work in Madras and cataract work in Europe is that in the former irrigation is very freely resorted to. "It is certainly very satisfactory to know that one has left behind an empty capsule.....cortex left behind is always a potential source of trouble." Any danger of loss of vitreous from the irrigation is more than compensated for by its advantages.

Herbert's sclerotomy, (wedge isolation method), was done on 36 eyes. Of 19 chronic glaucoma cases thus treated, 17 were improved. Seventy cases of keratomalacia were seen during the year. Sardine oil from the government fisheries was tried as a cheap substitute for cod liver oil in this condition, but was abandoned as it tends to produce diarrhœa.

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The report finally concludes, as usual, with a very interesting series of special cases; long standing iridocyclitis due to nasal sinus disease; *Cysticercus* infection, *Rhinosporidium seeberi* infection, *Bacillus pyocyaneus* infection of a corneal ulcer, a case of suspected Miculicz's disease with recovery; fatal cavernous sinus thrombosis and meningitis; fatal syphilitic meningo-encephalitis; and Parinaud's conjunctivitis.

If we have given some space to Major Wright's report, it is because of its great interest. Ophthalmological surgeons will do well, however, to consult the original. A document such as this at so low a price, obtainable from all agents for official government publications, is well worth study. The Madras Hospitals publish exceedingly full and interesting annual reports, many of them containing much of clinical interest. The hospitals of the other Indian Presidency cities might with advantage follow the example of Madras in this respect.

Correspondence.

MEDICAL RELIEF IN RURAL AREAS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Is it not time that steps should be taken to bring *qualified* medical relief within the reach of *all* classes of the population in this country? Working, as I have done, as a travelling doctor in rural areas, I have found that the people depend mainly on *unqualified* medical aid,—whether allopathic, homœopathic, *kabiraj*, electro-homœopathic or *hakimi*; and most of these practitioners are not merely untrained, but have not even any preliminary knowledge of the system of medicine upon which they depend in their practice.

Of the allopathic practitioners in the *mofussil*, one may recognise:—

(*a*) Those trained in private medical schools, and holding the diploma of a final examination. These men are, of course, qualified, though very many of them have not registered.

(*b*) Those who attended a medical school for one or two years, failed in their examinations, but are turned loose on the countryside to practice.

(*c*) Compounders; a few of them only men who have passed the compoundership examination, but the majority of whom have not done so.

(*d*) Men who have attended no medical or even compoundership course of training, who have not even learnt compounding under any qualified medical practitioner or in any charitable dispensary, but who rely for all their information on a Bengali book, "Jara Chikitsha for Family Use."

(*e*) Cloth merchants, *patshala* pundits or teachers in the lower primary schools, who depend mainly on two or three stock prescriptions,—a fever mixture, a cough mixture and a quinine mixture.

These quacks—for they can be called nothing better in classes (*b*) to (*e*)—attempt to practice medicine, surgery and even midwifery: they use poisonous drugs from the allopathic pharmacopœia, without knowing the first thing about their dosage, or the antidotes to such poisons.

The villagers of the rural areas are mostly too poor to call in practitioners of the assistant or sub-assistant surgeon class from a distant centre. In such circumstances they have to depend solely on these unqualified quacks for treatment,—men who are both would-be doctors and compounders combined,—whose mistakes and errors pass unnoticed and unreproved. In the large cities prescriptions are written for patients by qualified medical men and made up by passed compounders; in the *mofussil* there is no control or check of any sort.

Under such circumstances, cannot Government open a register for the allopathic medical practitioners of the villages and rural areas,—with remarks concerning the training, period of practice and address of each practitioner;—granting a license to practice if satisfied with the man's qualifications, or sending him for training to a Government medical school or even to a charitable dispensary, if not satisfied? Only under some such system can the conditions of medical relief in rural areas be improved, and patients be better treated and the practitioners concerned become better trained.—Yours, etc.,

S. P. NAG, V.L.M.S.

DASPUR, HOOGHLI:
1st September, 1924.

[*Note.*—Our correspondent's letter is valuable in its presentation of the *real* facts, but the subject raised is an enormous one. To some extent it is dealt with in our editorial in this issue; but we hope to deal with it later in more detail upon receipt of the detailed report of the Bengal Ayurvedic Committee. If real medical relief is ever to reach the whole of the Indian population, some organization which will be reasonably efficient, yet cheap, must be found. The existing Indian Medical Registration Acts follow almost verbatim,—as might have been expected,—that of Great Britain; they are still largely a dead letter, since perhaps the majority of qualified medical men in India have not as yet registered themselves.—ED., *I.M.G.*]

THE VENEREAL DISEASE PROBLEM IN INDIA.

IN a letter which is too long for publication *in extenso*, Dr. G. B. Bhattacharya, L.M.F. (Bengal), Lormi Dispensary, Bilaspur, draws attention to the extreme prevalence of venereal diseases amongst all classes of the Indian population, and suggests government legislation on the matter, and medical examination before marriage is permitted.

As to his contention of the extreme frequency of venereal disease in the Indian population, we believe that most of our readers will agree with him. The annual report for 1922 of the Public Health Commissioner with the Government of India records venereal diseases as being the most important factor in the "constantly sick rate" in the British army in India, and also a most disquieting rise in the venereal disease rate in the Indian army. The hospitals of India are full of cases of late complications of gonorrhœa, syphilitic paraplegics beg for alms in almost every Indian city street, the general Wassermann + rate for the Indian population has been estimated by various observers at from 10 to 15 per cent. Also the problem is rendered still more difficult by features which it does not present in Europe,—such as the not infrequent cases of primary extra-genital chancres in adults, and of *acquired* syphilis in childhood and even infancy. Further, as our correspondent rightly observes, the Indian patient is all too prone to leave hospital the moment symptoms are relieved, and long before radical cure has been established, with the result that he or she may continue to be a menace to society and even to the innocent.

Our correspondent, however, seems rather to ignore the important work carried out by such agencies as the voluntary venereal diseases' hospitals in most of the large Indian cities, e.g., in Bombay and Calcutta; and the not inconsiderable amount of propaganda work carried out in this matter by the public health and voluntary aid societies. It is true that at present such activities only touch the mere fringe of the subject, but compulsory legislation in health matters is apt to remain a dead letter in this country. What is wanted is propaganda and education,—as in almost all public health matters in India.—ED., *I.M.G.*

A "TREATMENT" FOR PROLAPSUS UTERI.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In my district (Cuddapah) it is not uncommon for village women to insert the fruit of the *Bel* or *Bilva*

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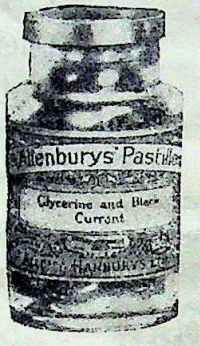

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